




IMPERIAL INSTITUTE
OF
AGRICULTURAL RESEARCH, PUSA,



Vol. VII—No. 1.
JANUARY, 1937.

FROM THE DIRECTOR
BOTANIC GARDENS
SINGAPORE

THE
M.A.H.A.
MAGAZINE

MALAYAN
AGRI-HORTICULTURAL
ASSOCIATION
KUALA LUMPUR.

88465



IARI

PRICE 30 CENTS.

**ALL
FERTILISERS
FOR
GARDENS,
LAWNS
OR ORCHARDS.**

Write for our free booklet on
SCIENTIFIC GARDENING

MALAYAN FERTILISERS LTD.

KUALA LUMPUR.

THE M.A.H.A. MAGAZINE

Vol. VII.

JANUARY, 1937

No 1.

	Page
EDITORIAL	1

HORTICULTURE.

BEAUMONTIA By R. L. Holtum M.A.F.S.	3
PRACTICAL ORCHIDS By John Livock	8
GARDEN PLANNING By I. Flipping C.R.H.	11
ORNAIMENTAL TREES OF MALAYA By R. L. Holtum M.A.F.S.	20
MISCELLANEOUS HORTICULTURAL NOTES	25

POULTRY.

FOWL POX AND ITS TREATMENT By A. H. M. J. J.	27
A RATION FOR GROWING CHICK	30

MISCELLANEOUS.

THE MUSHROOM, THE VOLVATE AND THE LEMNIA FODDER OF BY I. J. H. CORRIE M.A.F.S.	4
THE BIOLOGICAL CONTROL OF INSECT AND PLANT PEST By N. C. I. MILK LINDS L.F.S.	10

HOME SECTION.

THE SCIENTIFIC ASPECT OF PASTRY MAKING By M. A. T. TREVOR	13
---	----

REVIEWS.

THE MALAYAN ORCHID REVIEW	18
GARDEN BOOK OF BARBADO	19

SOCIETY NOTES.

SINGAPORE GARDENING SOCIETY QUARTERLY NOTE	51
SINGAPORE GARDENING SOCIETY QUARTERLY NOTE	52

THE M.A.H.A. MAGAZINE

The official organ of:

THE MALAYAN AGRI-HORTICULTURAL ASSOCIATION

THE SELANGOR GARDENING SOCIETY

THE SINGAPORE GARDENING SOCIETY

HONORARY EDITOR:

H. L. BARNETT,

Department of Agriculture, S.S. & F.M.S.,

Kuala Lumpur.

HONORARY EDITOR, HORTICULTURAL SECTION:

R. E. HOLTUM, M.A., F.L.S.,

Director of Gardens, S.S., Singapore.

The Magazine is published quarterly in January, April, July and October at 30 cents per copy. The annual subscription is \$1.20 (post free in Malaya).

Membership of the Malayan Agri-Horticultural Association (\$2 per annum) entitles members to the free issue of *The M.A.H.A. Magazine*.

The M.A.H.A. Magazine forms a useful advertising medium and rates are as under:—

Full page	—	\$10 per issue
„ „	—	\$35 per annum
Half page	—	\$ 5 per issue
„ „	—	\$18 per annum

Applications for space should be addressed to the Honorary Editor.

THE M.A.H.A. MAGAZINE

Vol. VII.

APRIL, 1937.

No. 2.

	Page
EDITORIAL	53

HORTICULTURE.

A METHOD OF INDUCING DAFFODILS TO FLOWER IN MALAYA ..	55
NEW OR INTERESTING ORNAMENTAL PLANTS. By R. E. Holtum, M.A., F.L.S.	57
MIXED BORDERS. By L. A. Logan Richardson	63
CRAZY PAVING IN MALAYA. By J. C. Nauen	67
MISCELLANEOUS HORTICULTURAL NOTES	70

POULTRY.

HATCHING UNDER A BROODY HEN	76
THE LIGHTER SIDE OF POULTRY REARING	81

HOME SECTION.

THE RELATION OF NUTRITION TO PUBLIC HEALTH	85
--	----

MISCELLANEOUS.

TERMITES. By N. C. E. Miller, F.R.E.S., F.Z.S.	88
SYDNEY LAKE, KUALA LUMPUR. By J. N. Milsum, F.L.S.	92
PAINTING AS A HOBBY AND AN EDUCATION	94
AGRICULTURAL LEAFLETS	84

SOCIETY NOTES.

SELANGOR GARDENING SOCIETY	96
SINGAPORE GARDENING SOCIETY	97

THE M.A.H.A. MAGAZINE

The official organ of:

THE MALAYAN AGRI-HORTICULTURAL ASSOCIATION

THE SELANGOR GARDENING SOCIETY

THE SINGAPORE GARDENING SOCIETY

HONORARY EDITOR:

H. L. BARNETT,

Department of Agriculture, S.S. & F.M.S.,

Kuala Lumpur.

HONORARY EDITOR, HORTICULTURAL SECTION:

R. E. HOLTUM, M.A., F.L.S.

Director of Gardens, S.S., Singapore.

The Magazine is published quarterly in January, April, July and October at 30 cents per copy. The annual subscription is \$1.20 (post free in Malaya).

Membership of the Malayan Agri-Horticultural Association (\$2 per annum) entitles members to the free issue of *The M.A.H.A. Magazine*.

The M.A.H.A. Magazine forms a useful advertising medium and rates are as under:—

Full page	—	\$10 per issue
„ „	—	\$35 per annum
Half page	—	\$ 5 per issue
„ „	—	\$18 per annum

Applications for space should be addressed to the Honorary Editor.

THE M.A.H.A. MAGAZINE

Vol. VII.

JULY, 1937.

No. 3.

	Page
EDITORIAL	99

HORTICULTURE.

THE BUNGOR OR QUEEN'S FLOWER (<i>Jagerstroemia flos-reginae</i>) AND ALLIED SPECIES IN MALAYA. R. E. Holttum, M.A., F.L.S. ..	101
<i>Odontadenia speciosa</i> . J. N. Milsum, F.L.S.	106
JAPANESE FERN BALLS AND DESIGNS	108
COMPOSTING	110
NEW OR INTERESTING ORNAMENTAL PLANTS. R. E. Holttum, M.A., F.L.S.	114
MISCELLANEOUS HORTICULTURAL NOTES	118

HOME SECTION.

THE COOKING OF MEAT. Mrs. A. E. Llewellyn	122
---	-----

MISCELLANEOUS.

INSECTS AND MAN. N. C. E. Miller, F.R.E.S., F.Z.S.	125
A SUPPLIERS' REGISTER	129

REVIEW.

GARDEN RUBBISH AND OTHER COUNTRY BUMPS	130
WHERE SMUGGLERS WALKED	131

MALAYAN AGRI-HORTICULTURAL ASSOCIATION.

REPORT OF ANNUAL GENERAL MEETING	13
ANNUAL REPORT AND ACCOUNTS FOR 1936	134

SOCIETY NOTES.

SINGAPORE GARDENING SOCIETY	139
-------------------------------------	-----

THE M.A.H.A. MAGAZINE

The official organ of:

THE MALAYAN AGRI-HORTICULTURAL ASSOCIATION

THE SELANGOR GARDENING SOCIETY

THE SINGAPORE GARDENING SOCIETY

HONORARY EDITOR:

H. L. BARNETT,

Department of Agriculture, S.S. & F.M.S.,

Kuala Lumpur.

HONORARY EDITOR, HORTICULTURAL SECTION:

R. E. HOLTUM, M.A., F.L.S.,

Director of Gardens, S.S., Singapore.

The Magazine is published quarterly in January, April, July and October at 30 cents per copy. The annual subscription is \$1.20 (post free in Malaya).

Membership of the Malayan Agri-Horticultural Association (\$2 per annum) entitles members to the free issue of *The M.A.H.A. Magazine*.

The M.A.H.A. Magazine forms a useful advertising medium and rates are as under:—

Full page	—	\$10 per issue
„ „	—	\$35 per annum
Half page	—	\$ 5 per issue
„ „	—	\$18 per annum

Applications for space should be addressed to the Honorary Editor.

THE M.A.H.A. MAGAZINE

Vol. VII.

OCTOBER, 1937.

No. 4.

Page

EDITORIAL	141
INDEX TO <i>The M.A.H.A. Magazine</i>	142

THE MALAYAN AGRICULTURAL ASSOCIATION.

THE FOURTEENTH MALAYAN EXHIBITION. H. L. Barnett	143
MALAYAN CHRISTMAS HAMPERS	152

HORTICULTURE.

THE GENUS STIGMAPHYLLON. R. E. Holttum, M.A., F.L.S.	153
OUR FERN HOUSE. Doreen Ingate	156
THE CALAPPA PALM. J. N. Milsum, F.L.S.	158
LOCAL PLANT GEOGRAPHY. Rev. Nigel Williams	161
THE NAMES OF GARDEN PLANTS. R. E. Holttum, M.A., F.L.S.	164
MISCELLANEOUS HORTICULTURAL NOTES	169

MISCELLANEOUS.

INSECT ARCHITECTURE. N. C. E. Miller, F.R.E.S., F.Z.S.	176
PERFUME FROM PROvence	180
RENEWAL OF MEMBERSHIP AND MAGAZINE SUBSCRIPTIONS	180

SOCIETY NOTES.

SELANGOR GARDENING SOCIETY QUARTERLY NOTES	181
SINGAPORE GARDENING SOCIETY QUARTERLY NOTES	182

THE M.A.H.A. MAGAZINE

The official organ of:

THE MALAYAN AGRI-HORTICULTURAL ASSOCIATION

THE SELANGOR GARDENING SOCIETY

THE SINGAPORE GARDENING SOCIETY

HONORARY EDITOR:

H. L. BARNETT,

Department of Agriculture, S.S. & F.M.S.,

Kuala Lumpur.

HONORARY EDITOR, HORTICULTURAL SECTION:

R. E. HOLTUM, M.A., F.L.S.,

Director of Gardens, S.S., Singapore.

The Magazine is published quarterly in January, April, July and October at 30 cents per copy. The annual subscription is \$1.20 (post free in Malaya).

Membership of the Malayan Agri-Horticultural Association (\$2 per annum) entitles members to the free issue of *The M.A.H.A. Magazine*.

The M.A.H.A. Magazine forms a useful advertising medium and rates are as under:—

Full page	—	\$10 per issue
„ „	—	\$35 per annum
Half page	—	\$ 5 per issue
„ „	—	\$18 per annum

Applications for space should be addressed to the Honorary Editor.

THE M.A.H.A. MAGAZINE

JANUARY, 1937.

EDITORIAL.

To usher in the New Year and the first number of Volume VII, we felt that a change of cover would be fitting, and we are indebted to Mr. N. C. E. Miller for the attractive design which you will already have studied. We have retained for four years the familiar brown cover until we began to feel depressed by it and, of depression, began to wonder if a brighter design might not encourage casual observers to consider the contents—and subsequent purchase.

We do not think that, considering its modest subscription and the wealth of authoritative articles it contains, the *M.A.H.A. Magazine* can be considered expensive, but it remains a sad fact that we have not yet the large circulation which we think we are entitled to envisage, it being principally restricted to the members of the Associations of which the journal is the official organ. We are sufficiently lacking in modesty to ascribe this absence of support to the fact that the Magazine is not well known in other parts of Malaya and not to a deficiency of interest in its contents. We appeal, therefore, to our readers to give us their assistance in making the Magazine more widely known by passing on the enclosed subscription form to their friends, or by supplying us with the names of friends who, they think, would appreciate complimentary copies.

We are anxious, also, to widen the scope of the *M.A.H.A. Magazine* so that its appeal will not be only to the horticulturist. The Malayan Exhibition, which is the major activity of the Malayan Agri-Horticultural Association, includes a variety of sections, Arts and Crafts, Preserves and Confectionery, Art and Photography, Needlecraft and Handwork, so that we can approach such and similar subjects with perfect justification, if justification is necessary. The one essential, we feel, is that all subjects should be dealt with from the Malayan point of view, or as they apply particularly to Malaya. We shall welcome the views of readers—and their contributions—on this subject of development.

In this issue we inaugurate a Home Section with an article on "The Scientific Aspect of Pastry-Making" contributed by Mrs. A. E. Llewellyn, who for two successive years has very ably organized the Preserves and Confectionery Section of the Annual Malayan Exhibition. Mrs. Llewellyn explains the principles underlying successful pastry-making and raises the subject from the level of the empirical methods of our local "cookies."

Mushroom Culture.

In previous issues of this Magazine, we have published accounts of various attempts at mushroom culture in Malaya and elsewhere.

We are indebted to Mr. E. J. H. Corner, the Assistant Director of Gardens, S.S., for an article which we include in this issue summarizing the knowledge at present available of the various types of mushrooms met with in Malaya. The article is a valuable addition to the literature on this subject, and will be of as much interest to those who are concerned only with digesting mushrooms as to those who attempt to cultivate them.

Insects versus Insects.

In "The Biological Control of Insect and Plant Pests"

contributed to this number by Mr. N. C. E. Miller, Assistant Government Entomologist, the author introduces an aspect of insect life that is possibly new to many of our readers: it is that of the use of insects to combat other insects and plant pests, and forms a subject of extreme interest, particularly to dwellers in the tropics whose sufferings from the attentions of the insect world are probably the measure of their appreciation of that world.

Rather outside the scope of Mr. Miller's article is the additional usefulness of insects as pollinators, and it is perhaps well to remember how dependent we are on insect life for quite a large proportion of our crops.

Garden Planning

In earlier volumes (IV and V) we published a series of articles by Mr. Flippance on garden planning in Malaya as applied to gardens of various sizes. We return to the subject in this

issue with the inclusion of a talk by Mr. Flippance to the Singapore Gardening Society.

Although we perhaps seldom have the opportunity to plan and lay out a brand new garden, much can be learned from experts in garden design which will be of use in improving existing gardens, and all of Mr. Flippance's articles should receive careful study by keen gardeners.

Poultry.

We are again indebted to one of our readers in British North

Borneo for an account of how an epidemic of fowl-pox was treated and cured, and this description of our contributor's methods will undoubtedly be of interest and help to other poultry breeders who have not yet been able to cope successfully with the disease.

We also reprint in this number, by the kind permission of the Adviser on Agriculture, an account of the next step in the investigations on the feeding of poultry which are being conducted at the School of Agriculture, Malaya, Serdang. An article on "The Food Requirements of Young Chicks" was reprinted last year in the July issue of this Magazine, and recorded the weight increase in young chicks obtained at Serdang with various experimental rations.

Horticulture.

BEAUMONTIA

BY

R. E. HOLTUM, M.A., F.L.S.,
Director of Gardens, S.S.

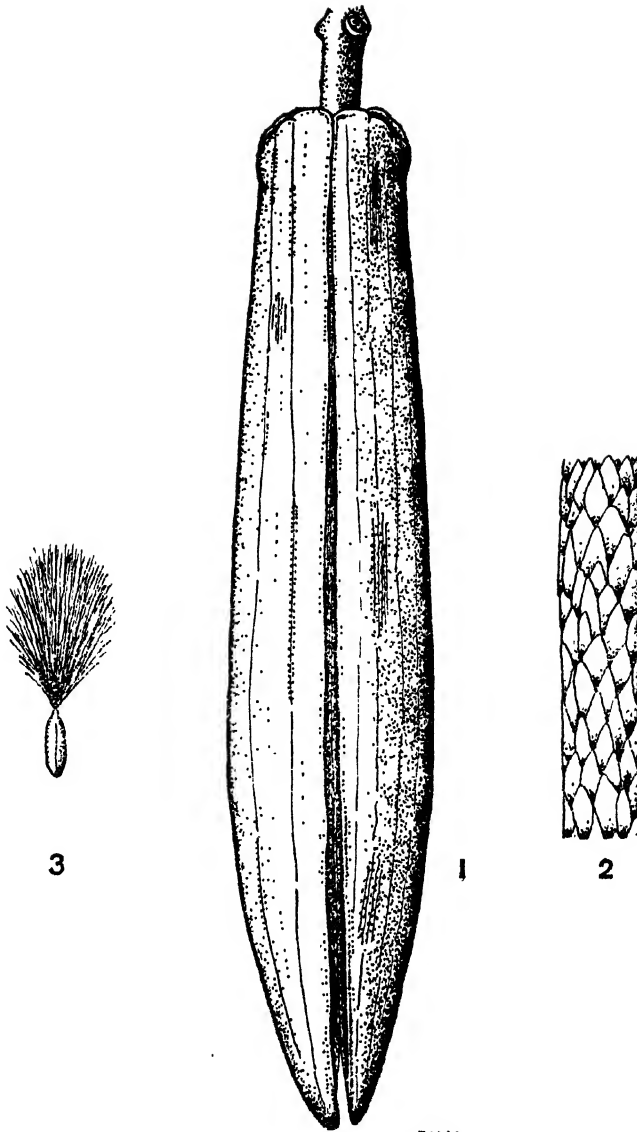
Beaumontias are stout climbers with large handsome white flowers, native of tropical Asia. They are related to the Chonemorphas which were described in a recent issue of this Magazine (Vol. VI p. 41), but are even more handsome. At least three species are known in Malayan gardens, but they are not so commonly grown as they deserve to be. They belong to the family Apocynaceae, which includes the Frangipanni, Oleander, Allamanda and other ornamental plants. Like other members of the family, Beaumontias have a milky latex. Whether they are poisonous I have no information; in a family of many poisonous plants they are open to suspicion.

The genus Beaumontia, as at present known, consists of seven or eight species, ranging from the Himalayas and Indo-China to southern India and Java. Unfortunately the descriptions of the various species are not all as complete as one could wish, and no botanist has made a proper comparative survey of the genus in recent years; furthermore, the origin of only one of the locally cultivated plants is known with certainty. The result is that the correct names of the cultivated plants are in doubt, and the names here given therefore subject to possible revision at a later date. I think, however, that a comparative account of the species in cultivation, which will enable readers to distinguish them from one another, will be of value at the present time. I am indebted to Mr. C. X. Furtado for assistance in naming the plants.

If anyone has a Beaumontia not agreeing with any here described, I should be glad to have particulars and if possible a specimen as a record.

General Characteristics.

All kinds of Beaumontia possess the following characters. The stem is stout and climbing, containing latex; it will climb, if permitted, to the tops of tall trees. The leaves are in opposite pairs, of simple form, large (commonly 7 inches long), usually dark green and shining on the upper surface, with a distinct network of small veins (seen very clearly against the light), the under surface with prominent main veins, in some species covered with soft hairs. The flowers are in large clusters at the ends of branches of the stem, white or nearly so, bell-shaped or cup-shaped, with spreading broad short free petals on the edge of the bell. The calyx has very characteristic differences in the various species, as described below, and should be noted particularly; its sepals are free almost to the base, and surround the narrow tubular lower part of the corolla. Within the cup of the corolla the stamens are joined together in a group with a pointed tip; they enclose the style and stigma.



J.N.M.

1. Fruit of *Beaumontia Jerdoniana* showing follicles spreading (reduced).
2. Compressed seeds removed from single follicle (reduced).
3. Seed with tuft of silky hairs assisting dispersal (reduced).



Photograph of immature fruit of *Beaumontia Jerdoniana* in
Mr. J. Hands' garden, Kuala Lumpur (reduced).



Baumonia multiflora on the pergola in the Botanic Gardens, Singapore.

The Cultivated Species.

The three locally cultivated species may be distinguished by the following key:

Calyx barely $\frac{1}{2}$ inch long	..	<i>B. multiflora</i>
Calyx 1 inch or more long		
Calyx reddish, corolla pink outside, the broad part cylindric	..	<i>B. Jerdoniana</i>
Calyx green, corolla cream outside, broadly funnel-shaped towards the throat	..	<i>B. Murtonii</i>

B. multiflora. I thus identify the species most often seen in Singapore. There is a specimen dated 1886, so that it must have been introduced prior to that date, presumably from Java, which is the home of *B. multiflora*. It is just possible, though I think unlikely, that our plant should be identified with *B. Khasyana*, which is a Himalayan species. *B. multiflora* is at once distinguished by the very small red sepals. The corolla has a very short narrow tube at the base (hidden by the sepals) and then broadens out into a wide shallow cup. It is more or less pink on the outside of the petals, owing to the presence of numerous short red hairs. The basal part is greenish outside and the throat inside is also greenish. The leaves are distinguished by being practically hairless beneath.

Beaumontia multiflora is a very vigorous plant if given good soil and plenty of room for its roots. It also has the virtue of flowering almost continuously. It has never been known to produce fruits in Singapore, and any records of fruiting would be welcome.

B. Jerdoniana. This species is native in southern India, being named after its discoverer, an engineer named Jerdon. If I name Malayan plants rightly, it is grown at Kuala Lumpur and at Penang, flowering well at both places. The sepals, which are about an inch long, distinguish it at once from *B. multiflora*, and also the leaves, which are softly hairy beneath. The corolla has a somewhat longer narrow tube at the base, above which it suddenly widens out to a cylindrical cup. It is suffused with pink on the outside as in *B. multiflora*; the buds are also red in colour.

This species flowers well at Penang and Kuala Lumpur but rarely produces fruits. At Kuala Lumpur it has fruited upon one occasion in the Public Gardens, and recently a number of fruits were seen on two plants in Mr. John Hands' garden in Ampang Road. I am indebted to Mr. J. N. Milsum for the following note on these fruits, and for the accompanying illustrations.

The fruit (Fig. 1) is 16 inches or so long with a diameter of 3 inches. It is green in colour, splitting longitudinally into two parts upon ripening. As in many allied genera of the family *Apocynaceae*, the seeds are flat and bear a tuft of hairs at the tip; this silky appendage assists in their dispersal. The seeds, arranged in two sections, are compressed against the hard polished endocarp. (Fig. 2). The tuft of hairs is also compressed but expands upon the opening of the fruit; it is somewhat variable in size (Fig. 3). The seeds

are $\frac{3}{4}$ inch long, narrow, and flattened. The number of seeds in each fruit is evidently large, as from the specimen examined a total of 460 was secured. Several showed the cotyledons projecting from the end of the seeds opposite to the silken appendage. It is evident, therefore, that germination takes place early after the seeds are dispersed. This is confirmed by the results of germination with the seeds sown immediately after extraction from the fruit. Germination is more or less completed within a few days of sowing the seeds. Growth of the seedlings is rapid but so far there is little available information as to the period of time before flowering occurs.

At Singapore our plant of this species has not flowered. As the same is also true of our plants of *B. Murtonii*, the fault may be in the siting of the plants, which we hope to alter shortly. It seems clear at least that under Singapore conditions *B. Jerdoniana* does not flower so freely as *B. multiflora*.

B. Murtonii. In 1928 Mr. F. N. Howes, of Kew, who was visiting Siam, sent us seeds of this species, and a number of seedlings were raised. Those planted at Singapore have not flowered, but one in the Public Gardens at Kuala Lumpur has flowered very freely. The following descriptive notes were taken from this plant. The species was named by the late Prof. W. G. Craib after H. J. Murton, who first collected it. Murton was Superintendent of the Botanic Gardens, Singapore, from 1875 to 1879. Dr. A. F. G. Kerr subsequently collected the species at Sriracha, not far from Bangkok.

Beaumontia Murtonii has leaves which are softly hairy beneath (also on the upper surface when young). The flowers are very fine, even larger than those of the other species above mentioned. The sepals are very large, more than an inch long and sometimes a full half-inch wide, green, the edges obliquely furrowed in a characteristic way. The narrow part of the corolla tube is $\frac{3}{4}$ inch long, the rest broadly cup-shaped (not so cylindrical as in *B. Jerdoniana*). The outside of the corolla is more or less cream colour, not pinkish; it is greenish in bud, in contrast to the reddish colour of the buds of *B. Jerdoniana*.

In addition to the three species above mentioned, a fourth has been recorded as cultivated in this country, namely *B. grandiflora*, native of the Eastern Himalayas. There are several records of the introduction of this species to Singapore, but no plants now survive in the Botanic Gardens, and I have seen neither plants nor specimens grown in Malaya. It seems likely therefore that the records are based on misidentifications. *B. grandiflora* is a very fine species, with flowers larger than in the others here described, the corolla being broadly tubular instead of cup-shaped, the tube four inches or more long. It should be tried again in the north of the Peninsula.

Cultivation of Beaumontias.

Beaumontias, being large plants, need plenty of room. They also need good deep soil to grow their best. They are essentially large woody climbers, which in nature climb up and cover the crowns of large trees. In the garden they may be grown over large wooden supports of any desired shape, or over a pergola. At the Public Gardens at Kuala Lumpur *B. Murtonii* is grown

in the form of a straggling bush, and flowers very freely in this condition, whereas the plant at Singapore which climbs on to the roof of the plant house has not flowered. It may perhaps need a more exposed position than the other species. *B. multiflora* seems to do best with its roots well shaded and its stems held up by a support.

As regards propagation, seeds of *B. multiflora* and *B. Murtonii* at least are very rarely obtained in Malaya, and vegetative methods must generally be used. Half-woody cuttings will root, though slowly; marcots or layers are also slow to root.

PRACTICAL ORCHIDS *

In my view there is no subject which is more profitable to discuss at a meeting of the Singapore Gardening Society than the subject of flowering orchids.

If we reflect, it is quite obvious that the *Vanda Joaquim* orchid has been worth millions of dollars to this Colony. There was a time when single plants were sold at a dollar a foot and even ten years ago they were sold at a dollar a plant. The price now is nearer a dollar a stick of ten plants; but it still remains a fact that the blooms are reckoned at one to two cents per flower. It is natural to reflect that such a flower in England would be worth round about a dollar instead of one or two cents, and not less in other parts of the world.

Unfortunately the *Vanda Joaquim* is almost the only orchid which has been rationalized and commercialized in Singapore with the possible exception of *Arachnis alba*, the white scorpion orchid. It is high time this is changed. When I go to England and see the nurseries of the big orchid growers such as Sanders or Stewart Low I find that orchid growing in England is almost confined to four or five genera. *Cattleyas*, *Cymbidiums*, *Cypripediums* and *Odontoglossums* account for at least three-quarters of their whole stock. There are a few other less popular genera such as *Miltonias* and *Oncidiums*, but the great bulk of the orchid families are dismissed as being almost contemptible financially.

Now in Singapore or any other small place where orchid culture is not rationalized you will find that when any one starts to grow orchids he first goes and buy two or three books. On looking through those books he will find that there are thousands of orchid species; and his first impulse probably is to try and accumulate as many species as he can. That is mere foolishness. I have passed through this phase myself and appreciate it. The whole point of growing either orchids or any other flowering plant is to get flowers—large flowers, beautiful flowers and brightly coloured flowers and as many flowers as one can get. Illustrations in a book are admirable but they are not flowers. What orchid growers in England realize, and what orchid growers here do not realize, is that there is one test only, namely, “has the plant any value as producing flowers for cutting purposes?” All other considerations must be rigidly rejected. I repeat, “Has the plant any value as producing cut flowers?”

Now the old style collections here have in the past been based on plants which we now label as interesting or botanical. The sooner the growers' ideas change on these matters the sooner we will give orchids a real, increased prominence in the flowers of Singapore. When we think of orchids like *Vanda Joaquim* and the White Scorpion orchid the proposition is so obvious that it is surprising that we have not been doing this long ago.

It is therefore necessary to consider what plants are most suitable in Singapore for this purpose. *Cattleyas* start slowly and are difficult to establish but they can do well in Singapore if they are well looked after; slowly a stock can be accumulated. When I say *Cattleyas* I do not mean only true *Cattleyas*,

* An address by Mr. John Laycock to the Singapore Gardening Society on 9th November, 1936.

but also *Laelias* and *Brassavolas* and their hybrids. I mention these plants first, because they are probably the largest and most beautiful flowers of the whole orchid race that we can get in Singapore. Unfortunately the other three genera which are so popular in Europe and America, i.e. *Cymbidiums*, *Cypripediums* and *Odontoglossums* are of no use whatever in Singapore. I have flowered *Odontoglossums* twice. I have a fair number of *Cypripediums*. I have done my best with *Cymbidiums* and of course I have flowered a few plants but all these genera are of no practical value whatever in Singapore. On the other hand plants like *Arachnis alba* will not flower in England. The *Vandas* are generally speaking bearers of beautiful flowers of medium size, and there are many *Dendrobiums* here which are beautiful and which fit in with our requirements.

In my opinion based on many years experience the only sensible thing here is to aim at a collection consisting entirely of *Cattleyas*, selected *Vandas*, *Arachnis* and selected *Dendrobiums* with a few others added such as *Spathoglottis*, some *Oncidiums* and a few more. Apart from isolated instances of suitable plants such as *Epidendrum radicans* I would advise that all other genera be cut out altogether. I cut out the *Phalaenopsis* with great regret, but with decision, as they are altogether too vulnerable to insect attack. The *Phalaenopsis* are lovely flowers but up to date no one has ever yet succeeded in growing any *Phalaenopsis* in Singapore for any number of years, chiefly for that reason. Of course if one buys a plant for 50 cents and gets one good inflorescence it is fair to say that one's cost has been repaid even though the plant dies.

Even within the limits I have already mentioned it is necessary to make a most careful selection. Let us take for instance the most beautiful *Vanda* which is *Vanda Sanderiana*. This is a very large and beautiful flower, well shaped and very suitable for cutting purposes, but unfortunately in Singapore it hardly ever flowers at all. I have a very fine collection of plants of *Vanda Sanderiana*—between 50 and 100 plants—in good health and fine condition, but unfortunately not more than 10 per cent. of them flower in any year. This orchid comes from the Philippines, where the climate is definitely more dry than Singapore and accordingly its energy here goes into growth rather than into flowering. The same is also true of many of the other Philippine orchids such as *Vanda Luzonica*, a lovely and gracious white flower with attractive purple markings, and *Vanda Merrillii*, a red *Vanda*. However beautiful the flowers of a plant may be, if it only produces flowers once in ten years or thereabout it is of little use to any grower and should be avoided. It is not too difficult now-a-days to get plants which will flower freely and produce beautiful flowers. *Vanda Marguerite Maron* is an excellent example of this type of plant. About 6 or 7 years ago I bought one plant from Bandoeng for Fl. 100. I now have about one hundred plants, and in six months' time I hope to have well over two hundred. The flowers are of good medium size; they last very well in a vase and they are perfumed. A plant now-a-days can be bought in Singapore for a reasonable price—say about \$10—and at this price it is an extraordinarily good investment.

In addition to floribundity we have also got to consider ease of propagation, so as to multiply our plants rapidly, the size and beauty of the flowers produced,

and the suitability of the plants for this climate. These are all most important factors; all ultimately directed to the production of the biggest and best of flowers in as large numbers as possible.

Now the semi-terete type of *Vanda*-hybrid is very probably one of the best that there is in these parts. The flowers of *Vanda Marguerite Maron* are superior to the flowers of *Vanda Joaquim* and the plant is just as free flowering. It is also quite easy to propagate. There are already a number of these hybrid semi-terete *Vandas* in existence. Unfortunately with the exception of *Vanda Marguerite Maron* they are almost all at present comparatively rare and therefore expensive and difficult to get. This is natural because they are all quite new hybrids, but there are many of them now being grown in Java and in Singapore. Very likely there are at least twenty new hybrids of this class which have not yet been flowered, as well as several that have only just been flowered within the last year or so. These hybrids can be got in Java without very much difficulty and it seems to me that it is a far better proposition to buy one or two of these plants which flower probably at least twice a year rather than to spend an equal amount of money on a plant of *Vanda Sanderiana* which you will have to keep for four or five years without ever seeing a flower.

At present we also have in cultivation a number of young hybrid plants, the female parent of which is *Arachnis alba*, the white scorpion orchid. When these flower they should prove to be very valuable plants, though I am inclined to think that they will not be so easy to propagate as the white scorpion orchid itself. One of the most showy of our native orchids here is the ordinary scorpion or spider orchid, *Arachnis flos-aeris*, the petals and sepals of which are blotched with dark brown and yellow-green. The flowers are large and perfumed. The plant is easy to grow and not difficult to flower. It is a remarkable thing that few people seem to grow any larger quantity of this plant. One would have thought that this was a plant which would be grown by thousands, but you will practically never see a flower of this for sale in any flower shop, though it is most suitable for cutting purposes.

All the new Java *Dendrobium* hybrids appear to be very suitable for Singapore. They can stand heat and moisture and they are useful for cutting purposes. A few species plants like *Dendrobium undulatum* and *Dendrobium veratrifolium* can be added to the list because they are pretty, free flowering, and suitable for cutting purposes, and their flowers will last a long time either on the plant or even when cut in a vase.

In all such matters supply, of course, only attempts to meet demand. If you go to the ordinary flower gardener you will find that the plants which he stocks are still entirely based on the lines of an old style collection and he has hardly any plants at all that fit in with my requirements. Naturally gardeners only stock what they can sell. If growers are willing to keep up the old style collection it is very little use looking for anything else in the gardens of the professionals who are only there to cater for the public. But I suggest that it is high time that the public taste in these matters changes on the lines which I have indicated above.

GARDEN PLANNING *

Part I. Introduction.

The subject of garden planning is a very large one and many books have been written on it. To attempt to convey some idea of the wide scope of the subject and at the same time to endeavour to impart some useful hints, in the short time at our disposal is not easy. However, the lines on which I propose to speak are briefly as follows. I shall mention (i) what are considered the principles to be borne in mind when planning any garden, (ii) the factors which should govern any proposed lay-out, (iii) the all-important abstract principle, (I use the term for want of something better) which should govern the planning, (iv) the classifications of the gardens met with according to size, (v) the application of the principles and factors to each type of garden, and (vi) plan a lay-out for a garden of medium size and see how our principles and factors work in making out that plan.

Gardens in British Isles.

In temperate countries the art of garden planning has a long history, and has passed through various phases, such as "formal," "informal" and "landscape," to mention but a few. To-day there are, in the British Isles and other countries, most beautiful examples of the art. There is no pleasanter way of spending some of the leisure hours of one's leave than in taking advantage of the opportunities provided by the kindness of the owners of inspecting some of these gardens in return for a small charge (usually 1s. 0d.) which is handed over to some deserving cause. By such means one may see many lovely gardens and gradually acquire a store of images and ideas which later on become valuable when one tackles the planning of a garden. Such gardens are generally of ample proportions and consist of a series of gardens within the garden. Here one finds the "Rockery," "Flower Garden," "Rose Garden" "Water Garden" (often either incorporated in the "Rockery" or situated somewhere near it, so that the water supply can be used for both) "Iris Garden" "Kitchen Garden" etc., while "Shrub Borders" "Herbaceous Borders," Pergolas etc., and above all trees, are used in the most effective positions in the general scheme of things.

Gardens in Malaya.

In Malaya we cannot expect to find such gardens as these, for they are the result of many generations of concentrated effort, while our Malayan gardens are, for the greater part, of more or less recent date. Neither can we expect to emulate them in exact detail for we have a climate which renders this an almost impossible achievement, keeping us too busy cutting grass, planting, etc., not to mention the numerous pests which are sent to try us. On top of all this the lack of skilled labour is another serious obstacle. However, there is a good deal we can do, if we are content to aim a little lower. We can still have our

* A lecture given by Mr. F. Flippance to the Singapore Gardening Society on 12th December, 1936.

garden with its smaller gardens incorporated and we can plan our garden so that the general effect is pleasing and on the right lines.

Principles.

We now come to the principles to be borne in mind when planning any garden. They are: (i) proportion (ii) simplicity (iii) spaciousness, and (iv) seclusion. I would prefer to make them all "S's" and call (i) "symmetry," but as this term might in practice be given an interpretation other than the one desired it is better to use "proportion." These are the great principles, and a garden planned to conform with them will be on the generally accepted lines for the best effects. In the interpretation of these principles a good deal of latitude is allowed and there is nothing more fascinating than to see the many ways in which they are aimed at by various garden architects. Indeed, this feature of garden planning provides a real means of self expression and to any one really interested, it can bring out latent talents which perhaps have had no chance to develop in other ways.

Factors.

The main factors which should govern any proposed lay-out are: (i) type of site (ii) type of house (iii) cost, and (iv) climatic conditions.

(i) TYPE OF SITE.

(a) *Nature of Land.*

It is obvious that conditions in respect to site can be very different. The site may be a flat one, (and this is perhaps the most difficult type to lay out effectively). It may be a sloping site with the garden area falling away from the house, for an architect usually places the house in the upper part of such a site. Less common is the garden site which slopes up from the house. Again, if the area is of some extent it may be of an undulating type and the planning of the garden will have to be considered in conjunction with the position of the house.

(b) *Aspect.*

The importance of aspect must be recognised. Whenever possible, if one is able to choose, it is best to have a site with a northern or north-easterly aspect, in which case the house will probably have a similar aspect and the garden area will be in front of it. With such an aspect the front and north-western side of the house will be kept relatively cool. This means greater comfort in the house and with the planting of a few large shade trees at the rear of the site, a comparatively cool area around the house. As many of our choicest plants in their early stages like the morning sun but dislike the hot afternoon sun, this arrangement will provide the necessary shade in the afternoon. To obtain something similar when the aspect is south-east to west, it becomes essential to plant some large shade trees more or less in front of or beside the house, which is not a good thing from a garden point of view.

(c) *Soil.*

The question of soil naturally is included in this factor. Hill sites are unlikely to have great depth of soil and what there is will probably not be very good. The quality and depth of the soil usually increases the lower down a

slope one's site is situated, until the best soil will be found in the valley sites. Therefore, though the hill top site will have the best views the valley site is likely to have the best soil, so we have to decide which we prefer and, perhaps more important, which we can afford. Again, swampy land which has been drained, but not filled, will have its own problems, while the soil of reclaimed areas will largely depend upon the type of filling used. Briefly summed up, hill sites are liable to provide poor soil, valley sites the best soil, drained swampy land, soil which will need a good deal of attention to improve it, and the soil of reclaimed land will be something in the nature of a lottery. Hence the position of the site affects the soil factor very considerably.

(ii) TYPE OF HOUSE.

This factor must be considered for, though new houses these days tend to be somewhat standardized, the same cannot be said of the older houses. In the latter case there are still a good number of the bungalow type in rural areas as distinct from the more recent two-storied buildings. Provided the proportion between size of house and size of garden is maintained, which in these days of increasing land values often is not so in town areas, the garden should be planned to harmonize both with the type of house and with the size of house. Again, a new house of up-to-date design does not demand an old world garden, while the old type of rambling bungalow or house does. A house built of stone or masonry, if of reasonable size, can stand a proportionate amount of masonry additions such as terraces, walls, paved walks, etc. On the other hand an old type of house, in the building of which a good deal of timber has been incorporated can stand very little of that type of lay-out but demands rather the more natural effects obtained with trees, grass, lawns, gravel paths, etc.

(iii) Cost.

This factor is of course an all important one. It must be considered in two aspects—firstly, the amount of money it is desired to spend on the lay-out, (the initial cost in other words), and the amount of money available for upkeep after the garden has been made. In regard to the former the initial cost must always be considered as a distinct item, for in operations of any size, additional labour will have to be employed, not to mention cost of materials, etc. In regard to the latter, it need only be said that if one or two kebuns are to be kept, it is of no use laying out a garden which will require three or four for efficient upkeep.

(iv) CLIMATE.

Though this factor does not effect us very much in this country, where climatic conditions are of such an even nature, it restricts very considerably the choice of plants suitable for the garden. There is a goodly number of proved things we can use and it is wiser to draw upon them for the lay-out than to introduce plants whose success is problematical. This experimental work can and should come later.

Inspiration.

This is my abstract principle which I have left till last. It probably sounds trite and perhaps not very important where the work can be governed by

such an array of rules. From personal experience, however, I have found it very necessary to wait for the right idea to come along. It is a very important thing where major operations are contemplated, for such works are usually costly and of such a nature that they cannot easily be altered. Therefore, though the difference between success and failure on the lowest plane can be estimated in dollars, from an artistic or aesthetic point of view, failure means probably an irreparable loss of an entirely different sort. Hence, I suggest that one should not be too hasty, when deciding on a plan, whether for the whole garden or for a part of it. With a little concentration on the matter the right idea or inspiration will generally come along and results will show just that difference between the "inspired" and the "uninspired" garden.

Classification of Gardens.

For general purposes gardens may be classified according to size, as follows:—

- (i) The Small Garden which has an area of from $\frac{1}{2}$ acre to 1 acre, that is an area of from about 49 yards square to 69 yards square.
- (ii) The Medium Garden which has an area of about $1\frac{1}{4}$ to 2 acres which would be an area of about 78 yards square to 98 yards square.
- (iii) The Large Garden with an area of $2\frac{1}{4}$ acres upwards to about 5 acres, which is an area about 104 yards square to 155 yards square. It is not usual for large gardens to exceed this maximum in this country and where larger gardens occur, with a few exceptions, it will be found that a large portion of the area is park rather than garden.
- (iv) The Public Garden is a type apart and may extend for many acres, and is of necessity a combination of garden and park, often embracing facilities for games such as tennis and bowls.

The figures given are only approximate and it must be understood that the various gardens may be of any size between the minimum and maximum given for each type.

Application of Principles.

The four "principles" mentioned earlier apply to each type of garden. However, a discussion of one of them "proportion," and mention of the others will be sufficient. In all gardens the proportion of roads, paths, lawns, trees, shrubs, borders, and beds, should be strictly preserved to obtain a harmonious whole. Similarly, the plants used in the lay-out should be proportionate to the size of the house and garden. For example, the trees used in the Small Garden must not be of a large type such as "Tembusu" or "Rain Tree," but should be of a type commensurate with the size of the garden such as *Peltophorum ferrugineum*, *Cassia fistula*, Jacaranda and such like trees. The Medium Garden gives a chance to use a few of the larger trees, with a proportionate lay-out in other respects, but it is in the Large Garden that the full value of our trees, shrubs, etc. can be obtained. Here, the large types of trees such as Tembusu, Angsana, Flame of the Forest, and Rain Tree, can be shown to

advantage, while flowering shrubs can be used in masses or groups. Herbaceous borders of good length can be provided; a good pergola and some archways can be erected at suitable points. If the house is of a suitable type, a terrace garden with perhaps a lily pool can be made. All this depends upon the area, and a sense of proportion must be maintained in developing a plan even for the Large Garden. In the Small and Medium Gardens we must be content to aim a little lower and at all times preserve our sense of proportion.

Of the other principles little can be said now, as they require special study and time is too limited to enlarge upon them. To mention them briefly: "Simplicity" speaks for itself; elaboration in almost anything, unless extremely well done, is not as a rule very successful and still less so in a garden. "Spaciousness" is the art of making the garden (or parts of it), appear larger than it really is and this requires particular care in planting, choice of plants and colours and is a large subject in itself. "Seclusion" needs little explanation, for most people like privacy in their own garden, so the first steps taken are to plant good boundary hedges and site trees to screen the house and garden from the immediate neighbourhood.

Application of Factors.

These will all, (or in part, according to the size of the garden) need to be taken into consideration. They have been discussed fairly fully and need not be further elaborated at this point.

Part II.

Introduction.

It is to be presumed that the whole site is being dealt with from the commencement. The architect has drawn up his plan which provides for levelling the upper portion of the site to accommodate the house, etc. In siting the house he has been requested to place it a little nearer to provide room for garden development on the north-west side of the house. Also, it has been decided that there shall be a single drive, as roadways must be kept to a minimum. These instructions have been complied with and the result is a pleasant, curved drive with sufficient space in the front of the house to allow cars to drive under the porch and around to the garage. This arrangement gives the house terrace a pleasant curve in the central part. The remainder of the site slopes to the main road and owing to the line of the latter leaves a deep corner in the northern angle of the boundary. Such then is the site to be dealt with, bearing in mind that the adjacent sites to left and right are occupied.

Area.

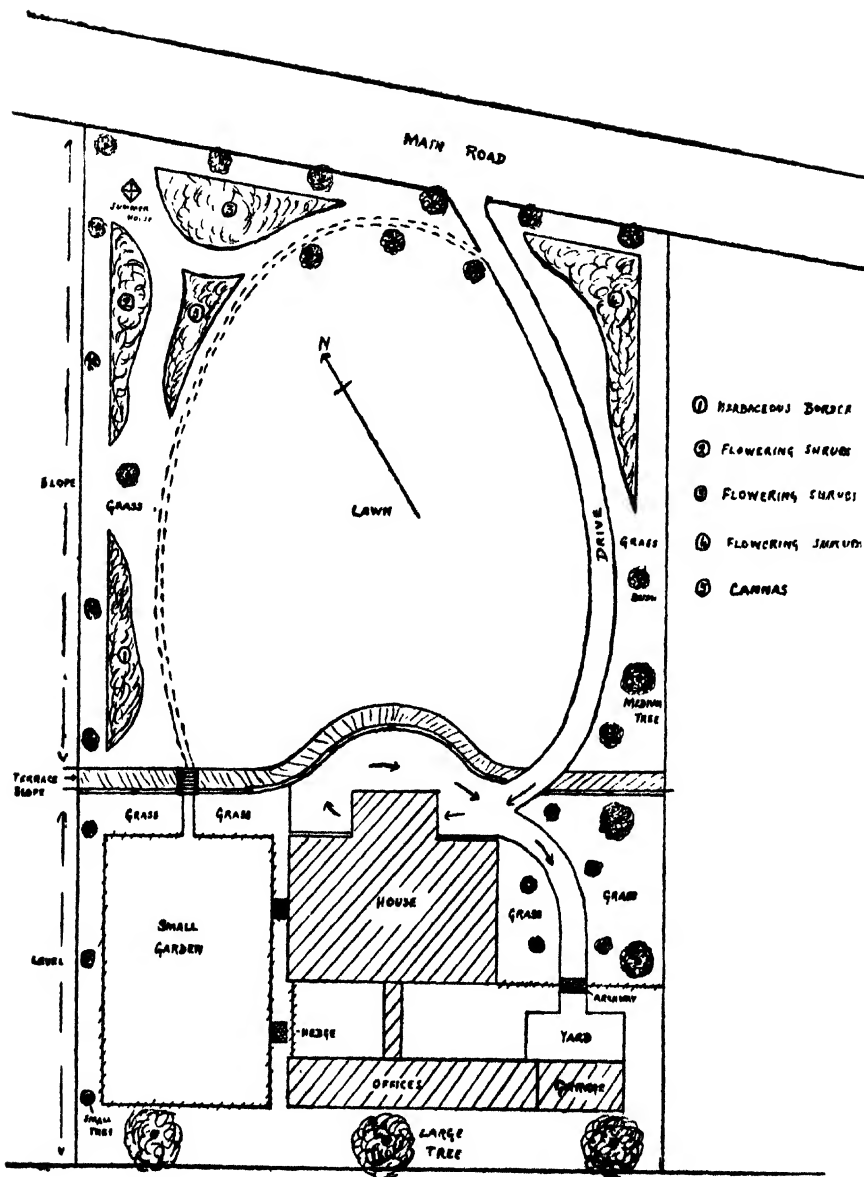
The area of this garden site is approximately $1\frac{1}{2}$ acres (or that of a Medium Garden), the balance being taken up by the house and offices.

Site Plan.

A plan of the site, showing position of house and offices, line of drive and extent of terraced portion has been obtained.

Plan.

All available information having been obtained the plan is now drawn up.



AREA - 1 AC. 2 RM 5 PM 16 VM

FRONTAGE - 210 FT.

MEAN DEPTH - 315 1/2 FT.

SCALE: 1 inch = 60 ft.

Y. H. H. H. H.
12-10-36

It is essential that this be done carefully and according to a convenient scale. All subsequent operations will depend upon the accuracy of this plan. All measurements on the land should be in accordance with the details of the plan.

Chief Points of Plan.

Having drawn up the plan let us examine its chief points.

(i) TERRACED SECTION.

(a) *Front of House.*

The house is to be of the masonry type, therefore a low wall around the line of the terraced section will be effective, with pillars for flowering pot plants. If this is too expensive a border of the turf will be pleasing on this line.

(b) *North-West Side of House.*

A small garden is arranged for, the type to be decided later. It may be a garden with small paved paths and bright flower beds, or it may be entirely of grass with bright small borders. A hedge encloses the area and may be low or tall to fit in with whatever scheme is adopted. Entrance from the house and the servants quarters may be by archways but not necessarily so. An exit gives on to a flight of steps down to the front garden.

(c) *South-East Side of House.*

The feature of interest here is a large archway spanning the entrance to the yard and garage. This, with the bush and hedge planting as suggested should almost completely screen the yard and garage, and provide a pleasing touch of colour.

(d) *Tree planting on Terraced Section.*

It should be noted that large shade trees are placed between the offices and the back boundary. These are to give shade in the afternoon. On the north-west boundary the trees are of the small, flowering type, with if necessary one larger one to provide a screen from the adjacent house. On the north-east side screening trees are suggested of medium size.

(ii) FRONT GARDEN.

(a) *North-West Side.*

This is the important side, as it contains the deep corner and must be laid out to give some sort of balance to the garden. To this end a path has been indicated balancing, and joining up with, the drive. This provides a means of getting round the garden and incidentally provides an alternative route to and from the entrance. The planting arrangement gives (i) a chance to indulge in a herbaceous border of limited extent, (ii) massing of flowering shrubs in two places, (iii) massing of Cannas, which may be in separate beds if desired, so long as the shape of the massing approximates to that shown, (iv) provision of a summer house in a secluded corner, and (v) various trees. The whole of the planting while balancing the garden, yet emphasises the deep corner and should give an effect of "extent" in the garden.

(b) *Main Road Boundary.*

The planting here is chiefly of trees of medium size, to screen the main road from the house, while the three trees inside the path are to screen the

garden from the road, particularly from the entrance.

(c) *South-East Side.*

Planting here consists of (i) a large mass of flowering shrubs, (ii) a few medium trees for screening from the next site, and (iii) a few large bushes of the *Bougainvillea* type.

(iii) **CENTRAL AREA.**

This is left completely untouched with the exception of the three trees at the lower end. There is ample room for a tennis court if desired, but if such is made it must be remembered that excavation will be needed, which will not improve the appearance of the front lawn and will detract from the feeling of space given by it.

General Points to Note.

In particular it should be noted that all planting has been concentrated, that is, herbaceous plants are together, flowering shrubs are together, Cannas are together while bush types are used by themselves. This prevents the "dotting" type of planting so prevalent in gardens which is not, as a rule, very attractive.

By a judicious use of flowering trees much additional colour should be obtained.

Hedges are planted all round the garden for the purposes of delineating the area and screening from adjacent sites. These should be carefully tended and be kept in good condition, as their appearance will make a great deal of difference to the general garden effect.

Additional planting can, of course, be carried out, provided the general scheme is adhered to.

Finally let us see how the principles and factors enunciated earlier, apply to this garden plan.

(a) **FACTORS.**

(i) *Type of Site.*

- | | | |
|---------------------------|---|--|
| (a) <i>Nature of Land</i> | — | House section—level
Garden section—sloping |
| (b) <i>Aspect</i> | — | Good, north-easterly
Small garden on quiet and cool side of house.
Drive and garage, on noisy and hot side of house. |
| (c) <i>Soil</i> | — | Terraced section—poor, due to cutting for levelling purposes.
Garden section—fair, being on the slope of a hill. |

(ii) *Type of House.*

New—masonry type, therefore suggested low wall and a small paved garden would fit in.

(iii) *Cost.*

Initial outlay—sufficient for complete lay-out on lines planned.

Upkeep—two men.

—if elaborated—three men.

- (iv) *Climate.*
 - Suitable plants selected.
 - Will experiment later.
- (b) **PRINCIPLES.**
 - (i) *Proportion.*
 - Has been maintained.
 - (ii) *Simplicity.*
 - Nothing elaborated in the plan.
 - Pleasant curved lines have been utilized in front section.
 - The small garden has been planned on an extended house line.
 - (iii) *Spaciousness.*
 - Large open grass space preserved.
 - Deep corner arrangement gives effect of greater "extent."
 - (iv) *Seclusion.*
 - Screened from adjacent sites and from road by hedges and trees.

ORNAMENTAL TREES OF MALAYA (*Continued*)

BY

R. E. HOLTUM, M.A., F.L.S.,

Director of Gardens, S.S.

The Family Sterculiaceae.

This family is almost entirely a tropical one, and consists chiefly of trees, none of which are at all well known to the average non-botanist. The best-known member of the family is probably *Theobroma*, the Cocoa tree, but this is not often seen in Malaya. There are between 50 and 60 members of the family native in Malaya, about 40 of them being trees. A few are very large trees but only one is mentioned as an important timber tree in Dr. Foxworthy's book on the timber trees of the Malay Peninsula; this is known by the Malay name of *Mengkulang*. The tree known to the Malays as *Dungun* (*Heritiera littoralis*) is common near the sea.

Though some of the trees of the family are quite handsome, it is only members of the genus *Sterculia* which are at all commonly planted for ornamental purposes. There is also the genus *Erythropsis* which might well be planted for the sake of its flowers, at least in the north of the Peninsula, but it has hardly yet been used for this purpose.

Sterculia.

Ridley describes 17 species of this genus as occurring in the Malay Peninsula, and there is also another, not uncommon in upper Perak, making 18 in all at present known. They all have one very striking characteristic which gives them decorative value, and that is the brilliant red colour of their fruits. Unfortunately most of them seem to fruit at rather infrequent intervals, and often scantily, at least in Singapore. At least one species, however, *S. macrophylla*, seems to be worthy of cultivation for its form alone, and in the north at least this species sometimes fruits freely and is occasionally a magnificent spectacle. Two other species, *S. parviflora* and *S. rubiginosa*, are common trees in the Peninsula and are occasionally seen in gardens. One species, *S. laevis*, is a common shrub in lowland forest.

The leaves are usually simple and entire. The flowers are small and are produced in groups in the leaf-axils. They have a tubular or cup-shaped calyx, often coloured, no petals, and the stamens joined together; an ovary is present in only a few of the flowers, so that the number of fruits is small as compared with the number of the flowers. The fruits are borne usually 3 to 5 in a group; each fruit is 2 to 3 inches long, pointed at the apex, and it opens along its inner edge, exposing the full extent of its brilliant outer surface. The skin of a fruit is comparatively thin, and inside are a few seeds which remain attached to the edge of the fruit when it opens. The seeds are blue-black, more or less oblong, with a curious glistening appearance; they form a very striking contrast to the brilliant red of the outer surface of the fruit and its



Sterculia rubiginosa: leaves and fruit. The fruits are brilliant red outside and pink inside; the seeds are almost black.

pink inner surface. Ridley records that birds quickly remove the seeds, which are of course very conspicuous; but there is no flesh on them and it seems doubtful whether the birds really eat them. A common Malay name for these and other brightly coloured fruits which do not seem to be very edible is *Tangisong Burong*, meaning "birds' lamentation."

***Sterculia macrophylla* Vent. Milian.** An erect tree, up to 100 feet or more tall; the bark not fissured; the base of the trunk buttressed; the branches in definite groups rather distantly spaced on the trunk, comparatively short, horizontal with the ends ascending, the twigs thick and hairy.

The leaves are large, ovate or almost round, cordate at the base, densely shortly hairy, (velvety) on the lower surface, 8 to 16 inches long and up to a foot wide, on hairy stalks 3 to 6 inches long. The flowers are very small, in much-branched inflorescences, and are produced with the young leaves. The fruits are rather thick and stiff, shortly hairy, and bright red, though not usually so brilliant as those of some other species.

This is a tree of lowland forest, found throughout the Peninsula. In Singapore it grows poorly in exposed positions, and it probably requires a fairly rich soil and slightly sheltered position for good growth. There are some very handsome trees in Penang, one being in the Waterfall Gardens.

S. macrophylla is a deciduous species. In Singapore, trees lose their leaves at rather irregular intervals of about 9 to 11 months, producing new leaves immediately or after a short bare period. One tree in Penang has had a period of 9½ months between successive crops of new leaves. The flowers are borne with the new leaves, and the fruits ripen four months or more later.

As a shade tree, this species has little value, but its tall and rather formal erect habit is quite decorative and it could be made use of for landscape effects. When in full fruit it is very striking, but it does not seem to produce a full crop of fruit after every flowering.

***Sterculia parviflora* Roxb.** (often called "Kělumpong" in Selangor, Perak, and Kedah) is an erect tree of about 50 feet in height, more closely branched than *S. macrophylla*, presenting a pleasing mass of foliage. Its fruits are among the finest of all local species. The leaves are stiff and almost hairless, up to as much as 10 inches long and 5½ inches wide, broadest near the apex and suddenly narrowed at the base. The flowers are small, in shortly branched hairy bunches, and the fruits are up to 3½ inches long, very brilliant. Like *S. macrophylla*, this is a deciduous species. It is common in the Peninsula, and its distribution extends to Burma and CochinChina.

***Sterculia rubiginosa* Vent.** is a small densely bushy tree, 20 to 30 feet in height, not usually deciduous. The leaves are about 5 to 8 inches long, 2 to 3 inches wide, narrowed to the base, shortly hairy beneath, thin in texture; the flowers are borne in pendulous inflorescences and are covered with pink hairs. This would be quite a useful tree in a thicket for screening purposes, but it is apparently slow in growth. It often flowers profusely and quite prettily, but in Singapore never seems to produce many fruits.

Sterculia carthaginensis Cav. is a South American species of which one tree is growing in the Singapore Botanic Gardens. It is a handsome tree of moderate size, with large stiff palmately lobed leaves. It is deciduous, usually losing all its leaves in February, and flowering with the new leaves. Unfortunately it has never yet produced any seeds. This species evidently thrives in Malaya, and would be quite a useful ornamental tree.

Erythropsis.

This genus consists of two species, closely allied, one in India and one in Malaya. It differs from *Sterculia* in the long tubular calyx and in the fruit, which is papery. Its decorative value lies in its brilliant orange flowers, borne in masses when the trees are bare of leaves.

Erythropsis fulgens (Wall.) Ridley. Mata lembu (round K. Lipis and Jerantut); Anting-anting (Penang); Menuang Payah, Berkundor, Dēdap hutan (Kuala Lumpur).

This is a moderate sized tree, found especially in the north of the Peninsula. It has the habit of *Sterculia macrophylla*. The leaves are said to reach to size of 15 to 18 inches long and wide; they are more or less rounded with 5 large pointed lobes; the base is deeply cordate. The smaller leaves may have no lobes, the midrib running to a shortly pointed apex. Small leaves have stalks 2 to 4 inches long; the stalks of the largest leaves are 15 to 20 inches. The flowers are borne in dense inflorescences 3 to 4 inches long; the whole inflorescence, including the flowers, is covered with a dense felt of small interlacing orange coloured star-shaped hairs, giving a woolly appearance. The sepals are joined into a tube about 1 inch long, dilated at the apex, with teeth $\frac{1}{4}$ inch long. There are no petals. The stamens are joined together in a long narrow tube which encloses the style and projects beyond the calyx. The fruits are thin, 5 to each flower, each with 2 seeds, and as they fall from the tree they spin rapidly and may be carried over 100 yards by the wind.

The trees are deciduous, flowering like the dadap after the old leaves have fallen, but in contrast ripening the fruits in 4 to 5 weeks, before the new leaves appear. At flowering time the trees give a very handsome and vivid mass of colour. At Penang, the trees flower about January or February; further south the time of flowering is less regular. No records of the occurrence of this tree south of Gemas are known, but young plants are now being tried in Singapore. This should be a useful ornamental tree in the north, where it can be relied on to flower regularly and well, but probably, like the dadap, its flowering in Singapore will be rather uncertain. Apart from its flowering it is not a particularly ornamental tree.

I am indebted to Mr. E. J. H. Corner for field notes on some of the trees mentioned in this paper, and for the accompanying photograph.

MISCELLANEOUS HORTICULTURAL NOTES

Montbretia.

As a result of the enquiry under this heading in our last issue, two ladies have kindly given information about the flowering of Montbretia in the lowlands of Malaya.

Mrs. Currie, of Sungei Batu Estate, Bedong, Kedah, writes as follows: "I had given me from Penang Hill about 2 dozens corms, nine or ten months ago. I had a bed made in the full sun, and the ground, which is very sandy, mixed with cow manure. This seemed to suit them very well. After having been in the ground four months or so, they began to flower; not a great many, but enough to cut for the house, still leaving some. The sprays were fine long ones, and the flowers about the same size as in England. They stopped flowering about a month ago (*i.e.* September). I left them in until the leaves were brown and have now lifted them. The corms have more than doubled themselves and I must have still left some in the ground as there are many shoots coming up." The previous history of these corms was that they were brought from England and tried on a different part of Sungei Batu Estate with no success; then moved to Penang Hill, and finally brought back again to Mrs. Currie's garden.

Mrs. C. G. Mawson, of Singapore, reports that she has grown and flowered successfully a bed of Montbretias, in burnt earth, in a sunny place.

It is probable that a light soil and good exposure to sun are necessary. It is also likely that periodical drying off, as with *Gladiolus*, is necessary to ensure flowering. It is further possible that some varieties of Montbretia are more free flowering than others in our climate.

Cannas from Seed.

In a recent issue of this Magazine (Vol. VI, p. 21), Mr. J. L. Pestana gave an account of a method of hybridizing Cannas, and also gave some data as to the growth of seedlings. Mr. J. N. Milsum has since made similar experiments. He confirms that the method of pollination is satisfactory and has found that much more rapid results can be obtained than those given by Mr. Pestana. Mr. Milsum's data are as follows:

The period from pollination to ripening of the pods varied from about 20 to 24 days. The seeds were sown as soon as the pods were ripe, without drying. The first seeds germinated in 16 days after planting, and the majority germinated within a month. The plants were carefully grown in pots, singly, and the first plant flowered in 2½ months from the germination of the seed. Thus, from pollination to flowering of the seedling may take as little as four months. This would allow three generations of plants in a year, which is very rapid work, and would make intensive Canna breeding a quite practicable matter, provided one had sufficient resources of ground and labour at one's command.

It is likely, however, that for any striking novelty to appear in Cannas, it will be necessary to introduce another wild species into the stock.

Bauhinia corymbosa.

Bauhinia corymbosa is a small-leaved climbing species, native of southern China. Seeds were obtained from Honolulu a few years ago, and several seedlings were raised at the Botanic Gardens, Singapore. Two of these when planted out grew very vigorously, and after four or five years one of them has produced a few flowers. The flowers are rather small, in close clusters at the ends of the branches. They are clear pale pink in colour, with dark red stamens making a pleasant contrast.

When in full flower, this must be a very beautiful climber. Its small foliage is very neat, and makes a very even close cover, so that without flowers the plant is very attractive and makes a good screen. It is doubtful whether it will ever flower well in Singapore, though it might do better in sandy soil than in the heavy soil at the Botanic Gardens. It should certainly be tried at one of our hill stations.

Violets.

Most people grow a few pots of common violets, which flower practically throughout the year. Nobody knows where these plants originated, nor how long they have been in Malaya, nor whether they have in any way changed since their introduction. Did they thrive from the start, or were they by some means gradually acclimatised? Is the present stock the result of one or many introductions? Does any English violet plant brought to Malaya adapt itself at once to local conditions, or is it only the exceptional plant, differing from its fellows in some unexplained way, which will survive? These questions indicate how ignorant we are about many local garden plants, and also indicate the kind of information which might be recorded in this Magazine. There must be many local gardeners who make experimental introductions, with interesting results of success or failure, and these results might be of great help to other gardeners if they could be put on record where all could read them. They may also be of historic interest in later years.

The purpose of this note however is to call attention to a very pretty little violet which is grown in quantity at Cameron Highlands. It has small flowers, variegated mauve and white, small, almost round, leaves, and slender runners by means of which it spreads rapidly. This violet must have been introduced to the Highlands within the past few years, but nobody seems to know where it came from. The story of its introduction would be very interesting, and it might also assist considerably in the naming of the species, as violets are numerous and unless one knows the origin of a plant it is difficult to know where to look for a description of it. This violet is also very easy to cultivate in the lowlands, and makes a pretty plant for a small hanging basket.

While on the subject of violets, reference may be made to the wild species which grows at the Highlands, usually near the streams in the Renglet and Telom valleys. Mr. Ridley has identified this native violet with the species *Viola Burgersdijkii*, which is found in Java and Sumatra. There are several native violets on the mountains of Malaysia, but they are hardly showy enough for cultivation.

The Lettuce Tree.

The Lettuce tree (known botanically as *Pisonia alba*) is a most useful plant, but it is surprisingly rare in local gardens. There are a number of fine old plants in various parts of Singapore, but they are not nearly so abundant as in Colombo, for example. The beautiful fresh light yellow-green of the foliage of this bushy small tree lightens any garden, and young plants in the form of close bushes (to which they may be trained by judicious pruning) are most useful in semi-formal effects. The plants never seem to flower or fruit under local conditions and must be propagated from cuttings, which root fairly easily. There seem to be two varieties of the lettuce tree, one with much paler leaves than the other; the pale form is said to be female and the darker form male, but I have been unable to confirm this owing to the absence of flowers. The leaves are edible. The plants need good drainage to grow well.

R. E. H.

Standard Hydrangeas

The growing of Hydrangeas as standards has proved a novel way of treating these plants, showing them off to better advantage and increasing their usefulness. Although a little extra care is required during the initial stages of their growth, in matters of training, the actual growing of the plants is similar to that practised in the ordinary way. It will however be found advantageous to grow the plants in small pots (6 inch size) for some length of time to ensure a good root development.

In growing standards the first consideration must be to develop a main stem; every effort should be made to develop this stem sturdy and straight. Staking and frequent tying is important and all growths, excepting the one being trained, must be checked as soon as they appear. The plants grown in this way will make quite a considerable growth before showing signs of flowering, at which stage the growth should be cut back to a little more than half its length and the plant potted on into an eight or nine inch pot. When new shoots are formed, one is selected as a leader to continue the main stem of the standard, the others being removed. From this stage onwards very few difficulties should arise and the plants should reach a height of three feet or more before again showing signs of flowering. Three feet being a useful height for the stem of the standard, the plants should be cut back to this height, but this time the top six lateral growths should be allowed to grow and develop

flowers. The first stage of growing the standard has now been reached and subsequent pruning should only consist of shortening back lateral growths to two or three buds and the checking of all unwanted growths.

Hydrangeas, especially when grown as standards, like rich soil conditions and respond well to periodical feedings of liquid manure. It is not however until the plants have flowered twice or three times that a change of soil is required. Half decayed leaves and a fair quantity of coarse sand should never be left out of their soil compost and bone meal should be included if possible.

As an incentive to growing Hydrangeas in this way it may be mentioned that in some English glass houses six years old plants, grown in 10 inch pots, have frequently produced as many as one hundred and fifty heads of bloom, each plant measuring about four feet six inches in diameter.

J. C. N.

Tropical Planting and Gardening, 4th Edition.

Published by Macmillan & Co., Ltd., London.

For some considerable time Macmillan's *Tropical Planting and Gardening* has been out of print, and the appearance of a fourth edition is therefore extremely welcome. This note is not in the nature of a review but merely to draw attention to the fact that a new edition is now available, priced at 25 shillings, and published in London; previous editions were published in Ceylon.

H. L. B.

Poultry

FOWL POX AND ITS TREATMENT

BY
AN AMATEUR.

We have recently had an epidemic of fowl pox in the poultry yard, and in my short experience of poultry breeding and rearing as a hobby it is the most serious disease we have had to contend with.

This is the third year in succession that fowl pox has attacked the poultry (August-September) so we must presumably accept it as an annual visitation. Each attack, however, has taught us much, and next year by means of spraying the poultry house and chicken runs we hope to avert the epidemic entirely as I understand that the germ is picked up from the ground. I also hope to try a course of vaccine on the birds if this is practicable in the tropics.

Fowl pox goes as suddenly as it appears but during the actual epidemic spreads rapidly and is very infectious. The disease manifests itself in the form of scabs or yellowish layers of a growth on the head, round the eyes and nostrils, in the ears, in the mouth and on the tongue, and in the case of turkeys on and in the fold of the wattles. It attacks poultry regardless of age from the youngest chick to the oldest hen. Fortunately, however, ducks and geese are apparently not subject to the disease.

The greatest danger of the infection spreading is when dry scabs fall and other birds walk over the ground where these have fallen and then by scratching infect themselves.

The worst cases are those in which the eyes, inside of the mouth, and ears are affected. In the last case a soft, yellow cheesy substance attached to the scab fills the whole ear. The disease also emits an unpleasant odour from the affected parts, sometimes most nauseating.

Apparently the birds' appetites and general health are not affected as a general rule, and with care and persistent treatment there seems to be no reason why any birds should die. Last season I lost a few chicks from blindness, and a full grown turkey cock. The latter I had killed as the inside of its mouth was too badly affected to justify a cure.

Situated as we are here, in a remote outstation with no expert poultry advice or vaccine available, we have to do the best we can with a combination of ordinary household drugs, persistency and patience. Any amateur poultry breeder, however, who has not yet experienced an epidemic of fowl pox amongst his poultry need not be unduly depressed at the thought of such a possibility. Only a small proportion of our fowls were affected—about ten per cent.—and if treated in time the infection need not spread far.

Our amateur efforts to cope with the epidemic have been satisfactory so an account of them may be of help to others situated like ourselves.

The 'outfit' used consisted of a supply of tincture of iodine, mercur-ochrome, Internal (a form of liquid paraffin), B.I.P. (a preparation of bismuth,

iodoform and liquid paraffin), cotton wool swabs on fine sticks, and a pair of tweezers. The latter I found essential.

It was obvious that neither my Javanese poultry man-cum-water-carrier nor I could devote all our time to treating the affected birds; nor was it possible to isolate all but the worst cases, so the method adopted was that each morning before releasing the fowls the poultry man picked out about half a dozen of the most badly affected birds and isolated them until I myself went round at about seven o'clock, when each bird was examined and treated, one of us holding it and the other operating. All scales were removed with the tweezers and where this was difficult and too painful, an application of Internal was first applied to loosen them. After removing the hard dry scales it was observed that the pores underneath were much enlarged, and, adhering to the scab, were what appeared to be small yellow grubs each of which had been lodged in a pore.

In such cases the treatment is comparatively simple and a second dressing usually suffices to clear up the disease entirely. Tincture of iodine is applied all over the part from which the scab has been removed, the bird marked for further treatment, released and fed.

It is of the utmost importance during the operation that the dry scabs or pieces of diseased skin should not be thrown to the ground, but collected into a coconut shell or on to paper and burnt.

In many cases treatment is not so simple. The parts affected, instead of having dry scabs easily removed, bear instead a soft yellowish skin which is not so easy to remove. As much as possible was scraped off without causing bleeding, and tincture of iodine or mercurochrome applied. (Some birds respond more readily to one than the other). Great care should be taken in applying tincture of iodine or mercurochrome when the eye lids are affected; boracic acid lotion may be used instead to wash the eye lids.

The turkeys and poults were more severely affected than the fowls, but to compensate for this it should be mentioned that they are the most patient and long suffering of the whole yard. I have sat with one of these birds on my lap operating for nearly an hour with tweezers, and the bird has hardly moved nor made a sound, and the probing and scraping at the inside of the ear must have been painful.

In such ear cases, after clearing out as much of the yellow growth as the bird can tolerate, apply a dressing of B.I.P. to the inside of the ear and plug well. The birds so affected should be examined every other day and the dressing changed until the ears are free from disease.

We have also learnt from experience that no matter how severely the bird is affected no scarring is left after a few weeks.

In one case a poult only a few weeks old was very badly affected round the eyes and mouth. Both eyes were nearly closed and the protuberances of diseased flesh on the face made feeding difficult for the bird with the result that it became very weak and thin. We seriously contemplated having it killed, but, knowing from our own experience that fowl pox is not necessarily fatal, we

decided to persevere with the treatment. Every day scales and rotten and torn flesh were removed until there was a deep cavity below the eye almost exposing the bone. Antiseptic dressings were applied and after a few days new flesh gradually began to form and the wound healed. To-day there is no sign of any disfigurement, a fact of which we are very proud. The poult has put on weight and is now on full range, and rapidly growing a tail and its last lot of feathers.

I also observed that during this present epidemic not a single bird which was affected last year was affected this year, but whether this is merely accidental or an established fact still remains to be proved.

Contrary to the general belief that the scabs should not be removed I found that removing them was essential for a cure. In several cases we were almost fatally deceived by an apparently healthy scab, but the wounds seemed to make no progress; at last on deciding to remove the scab again, we found several grubs still attacking the pores. That is why I consider the scales should frequently be completely removed and the skin below painted with tincture of iodine or mercurochrome until completely free from all signs of the fowl pox. The healthy skin then soon dries up and, as previously mentioned, after a few weeks leaves no trace of the former disease.

The above is an account of how we coped with an epidemic of fowl pox, and although no doubt our methods were unscientific and drastic they have proved effective. Comparisons are odious, but I quote from a well known poultry journal on the subject of fowl pox, “. a very serious disease to treat, which is now classed as fowl pox. Cure is really not to be recommended but preventive measures, especially that of vaccination are practicable. Do not try to detach the growths, but paint carefully over them with tincture of iodine once daily.” Again in another issue we read, “The disease from which the birds appear to be suffering is fowl pox, and my experience is that it is far better to confine one’s attempts to prevention rather than the cure of it. Should it be desired to try to cure same,—which I am not advising,—then the hard dark growths (scabs ?) could be painted with tincture of iodine avoiding the eye lids.”

It has been a worrying and anxious time but it is with much satisfaction that I look at my forty odd turkeys now all in good condition, when only a short while ago they were adorned with yellow and red dressings, and deformed with unseemly growths.

At least we are clear for a year and possibly with luck may not be inflicted by an epidemic in 1937. We sincerely hope so.

A RATION FOR GROWING CHICKS *

Introduction.

In a previous article (1), the author drew attention to the importance of correct feeding when raising pure-bred fowls under intensive or semi-intensive conditions, and advocated for young chicks a dry mash containing a liberal proportion of biologically good proteins, in the form of dried skim milk, balanced by carbohydrates, fats, minerals and vitamins. As a logical extension of that work, investigations have been carried out at the School of Agriculture, Serdang, on the feeding of growing chicks, i.e. young fowls from the age of 12 weeks (when weaning from chick mash is complete) until they are about to come into lay or are disposed of as table birds.

Good feeding is just as important with growers as with young chicks, but fewer biological and economic difficulties appear to be involved. Thus, general experience indicates that growers do not require more than about 12 per cent. digestible protein in the ration, and that they can make satisfactory use of various concentrates such as whale meat and groundnut or soya-bean cake which are of inferior biological value when fed to young chicks. Suitable growers rations are therefore less expensive, weight for weight, than chick rations.

According to Halnan (2), the energy requirements of balanced poultry mashes are about the same (60 to 65 per cent. of starch equivalent) for young chicks, growers and layers, the increasing demand for energy as body weight increases being met by a larger intake of food. As with young chicks, however, proteins and energy require to be suitably balanced by minerals and vitamins.

Growers Mash.

With the above considerations in mind, the following mash was evolved and has been tested at the School on various groups of growing chickens, mainly pure-bred Rhode Island Reds.

Growers Mash.

(Parts by weight)

Padi, ground, husk discarded	..	33 parts
Maize, yellow, ground	..	20 „
Bran, white cargo	..	20 „
Whale meat meal	..	10 „
Groundnut cake	..	10 „
Steamed bone flour	..	2 „
Powdered limestone	..	1 part
Salt	..	1 „
Red palm oil	..	3 parts
		<hr/>
		100 „

(supply about 12.3 per cent. digestible protein and 63.5 per cent. starch equivalent).

* By G. E. Mann, Principal, School of Agriculture, Malaya. *Malayan Agricultural Journal*, Vol. XXIV, November, 1936.

For purposes of comparison, average weights cited by Card and Henderson (3) were employed and are given in Table I. These weights cover the period from 14 to 22 weeks of age and apply only to pullets. Corresponding figures for cockerels are not available, but they would normally be somewhat higher. So far it has not been possible to attain these average weights with Rhode Island pullets raised at the School, and, for this reason, increases in weight have been converted into percentages to enable a fair comparison to be made.

Table I.
Average Weights of R.I.R. Pullets in U.S.A.

Age	Average weight	Percentage increase during past 14 days	Percentage increase over weight at 14 weeks
14 weeks	41.1 ozs.	—	—
16 "	46.6 "	13.4	13.4
18 "	52.2 "	12.0	27.0
20 "	58.9 "	12.8	43.3
22 "	64.6 "	9.7	57.2

The birds were accommodated in small grassed runs and housed in portable night-arks. Growers mash was fed from the 12th to the 18th week, after which layers mash was gradually introduced, the change-over being completed by the end of the 21st week*. The mash was fed dry and *ad lib.* from 7 a.m. to 6 p.m. daily, with fresh greenstuff each afternoon. In addition, a small quantity of whole grain (padi) was given from the 12th week onwards, beginning with a few grains scattered over the mash and leading to a separate evening feed which was gradually increased to 1½ ozs. per head by the 22nd week. The birds had constant access to coarse sand and crushed limestone. The layers mash contains the same ingredients as the growers mash, but the protein concentrates are increased at the expense of ground padi in order to provide the additional food material required for egg production.

Results.

The results obtained with three groups of Rhode Island and one group of Light Sussex pullets are given in Table II. For investigations of this nature, Light Sussex are reasonably comparable with Rhode Islands as both rank as heavy breeds.

* Rhode Island and Light Sussex pullets raised at the School usually come into lay at about 6 months of age—a month or so earlier than is usual in Europe and America. This sexual precocity is probably due to climatic and hereditary factors rather than to feeding. So long as pullets are up to breed weight, early maturity is an advantage. But it should be discouraged in fowls which are under weight for their age, and the desirability of introducing layers mash at a somewhat later stage will be investigated when opportunity presents itself. (G.E.M.)

- Table II.

Growth Rate of Heavy Breed Pullets at Serdang

Age	Card & Henderson's Figures			R.I.R. Group 48 (16 pullets)			R.I.R. Group 50 (7 pullets)			R.I.R. Group 52 (6 pullets)			L. S. Group 49 (8 pullets)		
	Average Weight	Percent-age Increase in past 14 days	Percent-age Increase over Weight at 14 weeks	Average Weight	Percent-age Increase in past 14 days	Percent-age Increase over Weight at 14 weeks	Average Weight	Percent-age Increase in past 14 days	Percent-age Increase over Weight at 14 weeks	Average Weight	Percent-age Increase in past 14 days	Percent-age Increase over Weight at 14 weeks	Average Weight	Percent-age Increase in past 14 days	Percent-age Increase over Weight at 14 weeks
14 weeks	41.1 ozs.	—	—	34.9 ozs.	—	—	34.0 ozs.	—	—	29.0 ozs.	—	—	39.5 ozs.	—	—
16 "	46.6 "	13.4	13.4	40.0 "	14.6	14.6	41.0 "	20.6	20.6	33.0 "	13.8	13.8	46.4 "	17.5	17.5
18 "	52.2 "	12.0	27.0	45.5 "	13.7	30.4	47.0 "	14.6	38.2	38.8 "	17.6	33.8	53.2 "	14.7	34.7
20 "	58.9 "	12.8	43.3	51.6 "	13.4	47.8	50.4 "	7.2	48.2	45.6 "	17.5	57.2	60.0 "	12.8	52.2
22 "	64.6 "	9.7	57.2	56.6 "	9.7	62.2	58.7 "	16.4	72.6	53.0 "	16.2	82.8	67.4 "	12.3	70.6

It will be seen that the average increase in 8 weeks varied from 62.2 to 82.8 per cent. of the average weights at 14 weeks of age, all groups exceeding Card and Henderson's figure of 57.2 per cent., and that on only one occasion did the fortnightly increase fail to reach the adopted standard.

It would thus appear that, for purposes of growth, the ration described herein is satisfactory.

Excluding transport charges from local dealers and the cost of grinding and mixing, the cost of the growers mash at the School is about 2½ cents per lb. This also is considered satisfactory.

Literature Cited.

- (1) The Food Requirements of Young Chicks, G. E. Mann, *Malayan Agricultural Journal*, Vol. XXIV, No. 5. 1936*.
- (2) Scientific Principles of Poultry Feeding, E. T. Halnan, Ministry of Agriculture and Fisheries, Bulletin No. 7, 1934.
- (3) Farm Poultry Production, Card and Henderson.

* Reprinted in *The M.A.H.A. Magazine*, July 1936.

POULTRY LEAFLETS

The Department of Agriculture, S.S. & F.M.S., has recently introduced a series of Poultry Leaflets which can be obtained free of charge on application. No. 1 was entitled "The Feeding of Poultry," and No. 2, "Hatching under a Broody Hen" has just been printed. The latter leaflet contains valuable information on the procedure to be adopted to obtain maximum results, and we hope to reprint it in a later issue of this Magazine.

Miscellaneous.

THE MUSHROOM, THE VOLVARIA AND THE TERMITE-TOADSTOOL

BY

E. J. H. CORNER, M.A., F.L.S.,
Assistant Director of Gardens, S.S.

The proportion of edible to poisonous kinds of toadstool is high. Because a few deadly ones happen to be common in Europe, where a considerable amount of experience and folk-lore has been coupled with an intensive botanical study of these plants, the contrary opinion prevails. The art of fungus-eating or, as it has been called, mycophagy is far advanced upon the Continent, but it is still regarded with mistrust by the insular 'Britisher', who looks with horror on the 'puffs' and 'puddockstoos' that find their way into the markets of an autumn. An eminent English authority has even stated that a distinction must be drawn between the fungus which is eaten on the Continent and that which is fit to eat, and truly many are not worth the cooking except perhaps for their consistency like agar-agar. In Malaya we are so ignorant in these matters that we have not a single authentic record of a poisonous species, although several there must be, and this uncertainty prevents us from enjoying the niceties which periodically deck the jungle. For it may be stated emphatically that there is no rule of thumb whereby an edible fungus may be distinguished from a poisonous; either it is or it is not, and one must know which a fungus is by fact and true identification: neither squirrels nor tortoises can safely be followed in their predilections. We have records, however, of some fifty edible kinds and of these the commonest and best known are the true mushrooms, the cultivated Volvaria and the wild Termite-toadstool.

The Growth of Toadstools in Malaya.

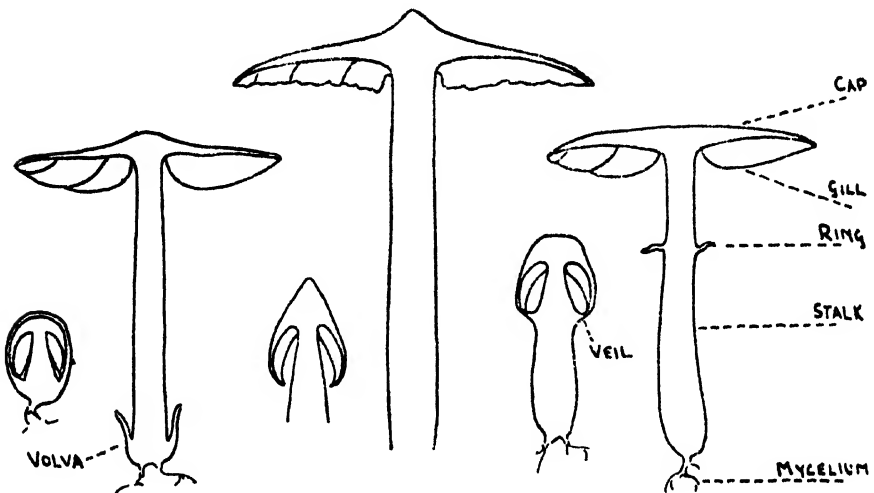
Though the food-value of mushrooms is negligible, the psychological influence of these humble plants is profound and it is a pity such incentive to early rising is so infrequent in Malaya: for that, however, there is only the climate to blame. Mushrooms there are in plenty, of more kinds probably than in the whole of Europe, but they live nearly all in the forest and their appearance is so capricious that we do not know exactly when to expect them, and they grow so fast that they may be up and over before we realize what we have missed. Were there regular seasons we should be more fortunate: the secret is that mushrooms, like most of our fungus, spring up only after dry weather. In the wet weather—and therefore during most of the year—they are underground in the form of delicate white threads which permeate the soil and absorb their food from the humus of decaying leaves, roots and stems: these threads are called the mycelium or, inappropriately, the spawn. The umbrellas which open above ground are the fructifications, and in order that mushrooms should

fruit in our climate it seems that their growth in the soil must be checked. A spell of dry weather lasting a fortnight or three weeks, or a longer period of intermittent fine weather and light showers, such as occurs at the beginning of the year and sometimes about August and September, has the effect of drying the surface-layer of the soil and of stopping for a while the growth of mushroom mycelium. When the thunderstorms and heavy rain return and the soil is again soaked, mushrooms may be expected in ten days. The fructifications need four or five days to reach the button stage, during which time they are hidden in the soil; they expand in 24 hours, overnight from button to umbrella; and the umbrella collapses of its own accord in one or two days, if it was not be-maggotted, that is, before it opened. The life of a mushroom fructification is thus little more than a week and it is visible only during the second half of that week. As the climate, too, is generally the same in any one part of the country, so the mushrooms in that part will fruit together, in much the same manner as pigeon orchids or angsana trees in any one district will flower together on the same days. Of such mushroom weeks there will rarely be more than two each year, one towards the end of each monsoon: to look for mushrooms at other seasons is a waste of time. If we knew when the week was coming, we could go into the forest and gather baskets full of big and little, white, yellow, grey, pink and purple, smooth or scaly kinds and more than we could eat. But we cannot forestall the maggots and they are the bane of the mycophagist. There is a large family of little flies, not to mention a host of beetles, whose occupation is to discover fungus fructifications and to lay their eggs inside them. In the high temperature the eggs hatch quickly and the maggots begin to eat their way through the flesh of the fructification as it expands and they hasten its decay by converting it prematurely into a sloppy, crawling mass. Mushrooms should be eaten the day they are collected, if one is to avoid disappointment; the maggots are then too tiny to be noticed.

The Structure of a Toadstool.

A toadstool, or, as it is called botanically, an agaric, consists of at least three parts. There is the stalk which bears the cap, and on the underside of the cap are one or more ranks of thin, vertical and radiating plates known as the gills because of their resemblance to the gills of a fish. In some cases the gills are crowded, and in others they are widely spaced as though they were the ribs of the umbrella. On the surface of the gills are developed the spores, which are minute reproductive bodies less than one hundredth of a millimetre long; when they are ripe they drop down from the gills in countless numbers and are spread about in the air like fine particles of dust. Each spore will grow into a new mycelium if it falls in a suitable place but only one spore in millions ever meets with such opportunity. In some toadstools the spores are white, in others yellow, brown, pink or purple and the gills have generally the same colour, though species with coloured gills and white spores are not infrequent. The surest way to determine the colour of the spores, as this is rather important in studying toadstools, is to cut off the stem and place the cap with the gills down

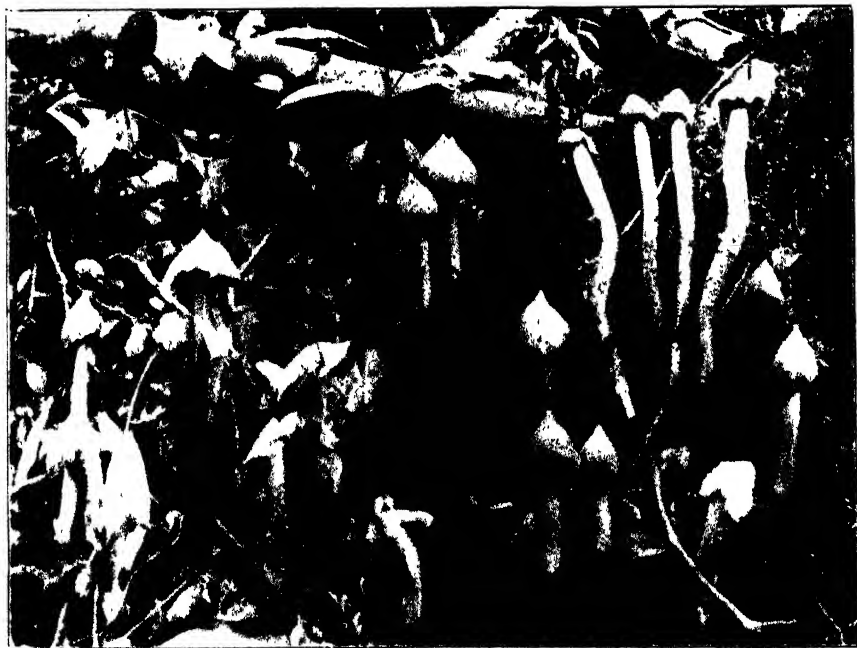
on a piece of paper and leave it for a few hours when there will be seen, on lifting the cap, a white or coloured powder of spores arranged in lines corresponding to the spaces between the gills. The inner substance of the cap and stem is called the flesh. Besides these features there are two others, both found on the stem. There may be a cup called the volva at the base of the stem, and there may be a ring about the middle of the stem; and some toadstools have both a volva and a ring. When such toadstools are in the button stage the volva is like a sheath which covers the whole button; as the stem begins to lengthen the volva is broken at the top, the cap is pushed through and the volva remains as a cup round the base of the stem. In the case of the ring, there is in the button stage a thin sheet of tissue called the veil connecting the edge of the cap to the middle of the stem and covering the gills; as the cap expands, the veil is torn away from its edge and drops back on to the stem to form the ring.



TEXT FIGURE 1. Vertical Sections through the Button Stage and the Fully-Expanded Stage of the Volvaria (left), the Termito-toadstool (centre), and a Mushroom (right).

Malayan Mushrooms.

Real mushrooms, which botanically are called *Psalliota*, are distinguished from all other kinds of toadstool by the following features. There is a ring on the stem, and the stem is easily twisted out of the cap; the gills are very crowded and are not attached to the top of the stem (in most toadstools they are attached to this part); the gills are white at first, then turn pink as the cap is half open and finally purple-brown because that is the colour of the spores. Unless a toadstool has these features it cannot be a mushroom and it is inadvisable, but by no means necessarily fatal, to eat it. The common mushroom which we find on lawns and golf-courses is rather small; it has a white cap, one to three inches wide, sometimes yellowish over the centre, and white flesh. It is very like some forms of the field-mushroom of Europe but never so large: however, it is not

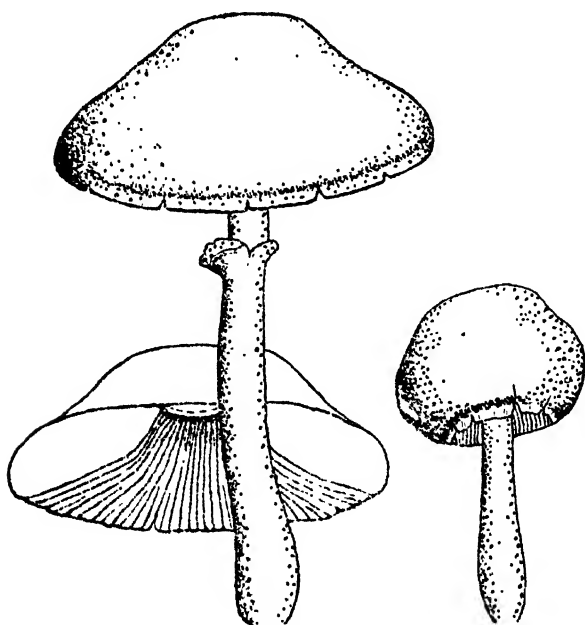


The Termite-Toadstool in the Jungle on Fraser's Hill.

The upper figure shows full-grown specimens with the split cap. The lower figure shows young specimens just emerged from the ground; the four on the right have been uprooted.

unusual to find that the same kind of toadstool has a large fructification in temperate regions and a smaller one in the tropics. There are a great many species of mushroom, the distinctions between most of which are very unsatisfactory so that they appear to be connected by intermediates. Some of our forest kinds are purple with a veil like gossamer; one is brilliant orange; and in not a few the white flesh quickly turns red or yellow and then blackish on exposure to the air, as when it is broken or bruised. One of these with reddening flesh sometimes occurs in gardens and is as palatable as the golf-course kind: its fructifications are generally in tufts, and the caps, which are one to three inches wide, are dingy brownish-white and often have darker flecks on them. None of these mushrooms are poisonous; the reddening of the flesh is not even a mark of indigestion. But some of the forest kinds have a bitter earthy flavour and they cannot be swallowed. Malayan mushrooms may grow to a size of eight inches across the cap but no specimens as big as some European kinds have been found. In contrast we have some midget mushrooms which stand only an inch or two high with the cap barely half an inch wide and often flushed pink or purple in the centre; they come up in troops, like 'hundreds and thousands', by paths in the jungle or on shady banks.

There is a relationship between mushrooms and horses. The field-mushrooms of Europe and North America generally occur where horses have been grazing, and horse manure is beneficial, though not necessary, in composts for raising mushrooms artificially. The relationship holds also in Malaya but our species can certainly grow where horses have never been.



TEXT FIGURE 2. The Golf-course Mushroom, *Psalliota* sp., nat. size. Drawing by J. N. Milsum.

The Volvaria.

The Volvaria, *V. volvacea*, is a kind of toadstool that occurs throughout the world. It is cultivated widely in the Netherlands Indies and to a small extent in Malaya, but it is rather rare in the wild state. The fructifications of the tropical form are often smaller than those of the temperate and, strange to say, the temperate form has generally been regarded as poisonous. A description and illustration of this species has already appeared in the *M.A.H.A. Magazine*, October, 1936, p. 179. Volvaria is distinguished by its pink spores, secondly by its thin crowded gills not attached to the stem, the gills being white at first then turning pink but never purple, and thirdly by the presence of the volva at the base of the stem and by the absence of a ring. The cap of *V. volvacea* is 1 to 6 inches wide and grey to greyish-brown. As a general rule pink-spored toadstools are poisonous and it is unwise to eat even a 'wild Volvaria', but there is another edible species, *Volvaria esculenta*, which is also described in this Magazine, 1936, p. 175.

The Termite-Toadstool.

The termite-toadstool grows from the nests of the ordinary white termite. It may be regarded as an offering of termitism to the epicurean world, for not only men and beetles but squirrels, monkeys, tortoises and slugs have discovered its exceeding palatability. Once I came upon the frayed stumps of the stalks of what had obviously been a troop of these toadstool in the jungle and, casting around for the cause of this misfortune, I met a tortoise round the buttress of a tree, licking the gills off its chops. The termites grow the fungus on the mudcombs which lie in the galleries of their earthworks. The combs are made of earth and rejectamenta, worked with some secretion of the termites into a kind of plaster, and on this the mycelium produces fluffy white patches which develop spores. The termites bite off the spores which are to them an important source of food: it is probable, indeed, that the creamy fat in the bodies of flying termites, which renders them objects of pursuit by so many kinds of bird and by some races of man, is derived directly from the fat of the fungus. At certain times of the year, sometimes after dry weather or at the end of the rainy season, and for reasons yet unknown, the mycelium produces its large fructifications and a crop of toadstools appears through the ground above the nest. The toadstools have very pointed caps, which are often split radially, very firm flesh and tough stems which cannot be twisted readily out of the caps; their gills are narrow, very crowded, almost free from the stem and have curiously uneven, jagged edges; the spores are pale pinkish-buff. The toadstools vary much in size; in some crops the caps are only one to three inches wide, in others they are five to twelve inches and, moreover, the toadstools from any one nest have always one or other of two forms. Either they have grey or brownish-grey caps and no ring on the stem, or they have white or greyish-white caps and a distinct ring on the stem. In either case the stem tapers for several inches underground and is commonly attached to the termite comb by a short white, fluffy pedestal. The firmness of the flesh and the pointed shape of the cap are connected with the circumstances of growth: the fructification being constructed deep under-

ground, it must be pushed through the overlaying soil; the cap is forced upward by the lengthening stem and it expands as soon as it is freed from the ground. A relationship between the length of the stem and the opening of the cap has been discovered experimentally in toadstools; if the cap is bound with a metal band so that it cannot open, the stem grows longer and longer: and so with the termite-toadstool, the soil prevents the cap from expanding and it is automatically thrust higher by the stem. Be careful in tracing termite-toadstools to their nests, for the jaws of the soldiers nip like scissors.

The termite-toadstool has no satisfactory botanical name. It has been placed in eleven different genera to none of which it belongs. No other kinds of toadstool at all closely related to it have been discovered and where the termites found it, or from what they could have fashioned it, there is no knowledge.

THE BIOLOGICAL CONTROL OF INSECT AND PLANT PESTS

BY

N. C. E. MILLER, F.R.E.S., F.Z.S.,

Assistant Entomologist, S.S. & F.M.S.

It is with a good deal of justification that the agriculturist and horticulturist view with dismay the invasion by insect pests of their crops or flower gardens, since if these pests are not checked they may undo the work of many months and cause considerable financial loss and disappointment.

In such circumstances it is easily understood that those insects and perhaps all insects may be referred to in language which is probably more picturesque than academic. There is, however, another side to the question. Comparatively few people realize that there are many insects, even those which are admittedly injurious, which are encouraged or cultivated for the sake of substances they produce which have a very real commercial value, and also, that there are other insects which are utilized by man in the control of injurious insects and noxious weeds.

One of the most important substances produced by insects which must be classified as injurious, is lac, a resinous substance secreted by a minute sucking insect which lives on various species of trees and is propagated principally in India. From lac are manufactured varnishes and polishes, and it is also extensively used in electrical work for insulating purposes, and in the manufacture of gramophone records.

The utilization of insects in the campaign against insects which destroy crops and against plants which, having been introduced primarily for ornamental purposes from another country, have spread with great rapidity and overrun many square miles of land owing to the fact that their natural enemies had not been introduced with them, was first put into effect about sixty years ago, although probably the first recorded instance of this type of scheme was in 1816.

With the expansion of agriculture, crops restricted to one country have been introduced to other localities where conditions for their growth are favourable. In such movements of crops and other plants it is almost inevitable that the insects accustomed to feed on them should not have been introduced at the same time, but it is more unlikely that the insect enemies of such insects should have been introduced simultaneously. That being so, the introduced insect pest, free from the attentions of its natural enemies, flourishes and multiplies unchecked.

Before setting forth in chronological order as far as it is possible to do so, the instances in which insect parasites and predators have been transported from one region to another, it will be advantageous to indicate the distinction between the two categories into which they are placed.

The distinction, therefore, is as follows. A parasite may live at the expense of its host for a relatively long period before the host finally succumbs,

whereas a predator usually seizes its prey which is either killed immediately or before many minutes have elapsed. Insects which are propagated for the purpose of destroying noxious weeds may be placed in the category of parasites, in that the destruction of the host is delayed.

We come now to the recorded instances of the world-wide search for, and introduction of, insect parasites and predators. The international movement in connexion with this work began in 1873 with the transfer of a mite (although actually not an insect) to France from the United States in order to attempt the control of that destructive scourge of the grape-vine, the Phylloxera. The following year, a beetle, belonging to the Coccinellidae, the family commonly known as "Ladybirds" was introduced into New Zealand from England. Nine years later a parasite of a caterpillar pest of the cabbage was imported into the United States from England. These efforts to attempt the control of pests by means of introduced parasites were, however, on a comparatively minor scale, but they may be justly termed the foundations on which the international biological control movement was erected.

Exploration for the purpose of searching for beneficial insects was henceforth placed on an organized basis, the first to be engaged in this kind of work being Alfred Koebele who was sent by the United States Department of Agriculture to Australia to search for parasites or predators which might control a "scale" insect attacking citrus and orange trees.

His success in this task was outstanding, as he was able to introduce into the United States a coccinellid which was entirely efficient in carrying out the work for which it was intended. This coccinellid, by the way, was eventually shipped to other countries, notably Portugal, for a similar purpose.

Koebele was engaged on this exploration work for twenty-five years, and, it is said that during that period he was responsible for the transference of a far greater number of beneficial insects than any other explorers who appeared later in the field.

Another noted explorer was George Compere of the Californian State Board of Horticulture. His activities were confined chiefly to the Far East and Australia in the first instance, but later, his exploratory journeys took him to many other countries. A third explorer, who also accomplished very valuable work, was Frederick Muir who worked principally in Hawaii.

The work of breeding and distributing parasites has taken on vast proportions since the inception of the international biological control movement, and many laboratories where the life histories of beneficial insects are carefully studied have been installed.

One of the most important of these is the laboratory of the Imperial Institute of Entomology, London, situated at Farnham Royal in the county of Buckinghamshire. From this laboratory which was established in 1927, beneficial insects to combat both insects and plants are being despatched to many countries, and, from the year of its foundation, approximately twelve million specimens making up over six hundred shipments have been distributed. Among these

specimens may be mentioned parasites of pests of wheat, fruit, forest and shade-trees, pests of garden and greenhouse crops.

It is essential to emphasize, however, that success has not been the outcome of attempts at control in every case. Nevertheless, the results in several instances have been very gratifying, and, in this connexion, this account would be incomplete if mention were not made of the introduction into Fiji from Malaya of a fly to control an extremely serious caterpillar pest of the coconut palm. This introduction, accomplished with considerable difficulty, and with the ready co-operation of certain shipping companies, was entirely successful and may be cited as another shining example of what is possible in the control of an important pest by an introduced parasite. Since that time, parasites have been despatched from this country to Borneo, Burma and Mauritius.

Regarding the control of plants which had been introduced originally for ornamental purposes, and had increased to such an extent as to become a serious pest and an almost insurmountable obstacle to the development of land for agricultural and grazing purposes, the most remarkable example is that resulting from the introduction of a moth to control the Prickly Pear in Australia.

This moth, known scientifically as *Cactoblastes cactorum*, the larva of which feeds on plants of the Cactus family, is commonly called the Argentine Moth Borer and is a native of Uruguay and the northern Argentine provinces. It was introduced from those regions, after an exhaustive search by members of a travelling commission sent by the Commonwealth of Australia for parasites to control the Prickly Pear which had established itself over 60,000,000 acres of good grazing and agricultural land.

That was the position in 1925, when it was estimated at spreading at the rate of 1,000,000 acres a year, but to-day approximately 25,000,000 acres have been reclaimed to such an extent that development is proceeding apace, and the land is being brought into production. Several other insects to assist in this work have also been introduced and strenuous efforts are being made to acclimatize them.

The foregoing outline of the utilization of beneficial insects is admittedly brief and perhaps does not do full justice to many other enthusiastic workers in this field, but if it succeeds in bringing to the notice of those who were previously unaware of this aspect of entomological work, that insects, although frequently a confounded nuisance, are also in certain cases of considerable benefit to mankind, it will have served a useful purpose.

Home Section

THE SCIENTIFIC ASPECT OF PASTRY-MAKING

BY

MORAG LLEWELLYN,

University of London Teacher's Certificate for Domestic Subjects.

Ruskin said that cookery was an art which required the touch of a painter and the skill of a scientist. Better results are more consistently obtained if the facts of science plus common sense are applied to the culinary art. Nowadays it is realized that cookery is a science and that consequently there are "whys and wherefores" for the various methods of cooking foods.

Probably the simplicity of the ingredients used in pastry—flour, fat and water—make it one of the most common foods in the English home and yet it is frequently badly made, indigestible and unpalatable.

Composition of Flour.

The composition of flour as the foundation of pastry must be understood. The endosperm or centre of a wheat grain is composed of starch; the 'germ' or young plant is rich in gluten which is a form of protein, and the whole is protected by a coating of cellulose, which is known as bran. Gluten has the characteristic of causing wheat flour to form a paste or dough when mixed with water, starch alone having no cohesion as can be proved for instance by mixing flour with water. The proportions of gluten and starch vary in different wheats which accounts for the grades of flour produced. Wholemeal flour contains all three parts but the bran is removed by sifting to form white flour, leaving a large proportion of gluten in what is known as hard or strong flour for general use. Soft or weak flours, sometimes called patent flours, *e.g.* Vienna or Hungarian, have a large amount of gluten removed which makes them suitable for rich pastries and cakes.

Flour must always be fresh, free from lumps and absolutely dry; if damp the pastry will be heavy, so it must be dried and allowed to get absolutely cold before use. Sieving is essential to free flour from lumps and to aerate it.

Rules for Pastry Making.

The first rule in the making of all pastry except choux and hot-water crust is to keep everything as cold as possible. The second is to entangle and incorporate into the mixture as much cold air as possible. The scientific reason behind these two rules is the same. Air is a gas which when heated expands and decreases the density of a substance. Therefore the colder the air in the mixture, the greater the expansion when heat is applied and consequently the lighter the mixture. The third rule demands that the liquid be added to the flour quickly to ensure even distribution and a smooth texture. Only enough liquid to make a firm, elastic dough should be added.

There is a great deal of common sense behind the rules for rolling all pastry. Always lightly flour the board and rolling pin, not the pastry, as, if the consistency is correct, only enough flour to prevent sticking is required and any more gets rolled into the pastry, making it heavy and dry by increasing the amount proportionate to that of the fat used. While rolling, the pastry should be kept a good shape; start with a block and with short, sharp rolls, roll it out to a rectangle. Keep an even pressure to ensure an even thickness otherwise some parts will cook through before others. Always roll forwards, never backwards or across as this causes uneven pressure, and never roll over the ends. Stretched pastry shrinks when cooked, therefore turn it round (never over) on the board, push *in* to shape lightly, and roll *out* to the desired size. Never stretch out to the size or shape required. Unless baking powder has been used better results are obtained if the pastry is put on a floured paper and covered in a cool place for about an hour. Do not put on ice as this makes it damp and do not leave for a longer length of time or the outside will harden.

The Use of Fats.

Butter, lard, clarified dripping, clarified fat, margarine, suet and vegetable fats are suitable for pastry-making, the kind of fat often determining the method of making and the baking of pastry. The fat must be fresh and of a good quality as any rancidity becomes more pronounced after cooking. Fresh butter is best for the richer pastries, but any salt or water must be removed as the former may cause hardness and the latter heaviness. A mixture of fats is economical and makes excellent pastry. Lard makes light pastry as it is 100 per cent. fat; also as it tends to lessen the cohesion of the flour, but owing to its low melting point it oils easily; if this occurs a tough pastry results. Lard also lacks flavour, but used in conjunction with butter or margarine it is excellent; the lard provides lightness and the butter colour and flavour.

In short crust pastry the fat is rubbed into the flour until the mixture has an appearance of fine bread crumbs. Rubbing must be gentle or the fat will oil, friction producing warmth. The aim in pastry-making is to introduce as much air as possible, hence the method of lifting the fat and flour above the basin, rubbing gently and letting it fall. The spreading of the fat over the surface of the paste is the method of making flaky pastry; the subsequent careful folding and rolling entraps air. Mixing the fat in small pieces with the flour and water and then rolling it holds air in a similar way (rough puff pastry). For puff pastry the fat is enclosed in the paste, and many foldings and rollings distribute it between fine layers of dough.

In suet pastry the fat is chopped finely or shredded before it is mixed with the flour in order to obtain an even mixture of the two ingredients. Having a high melting point this is most important otherwise when heat is applied the fat will not melt readily enough to be absorbed by the bursting starch grains in the flour. Since one of the main reasons for a light pastry is an even distribution of the fat and flour, it can be readily understood that the finer the division of the suet the better.

Here in Malaya suet is bought largely in tins, cleaned, all skin removed and commercially packed. The same firms pack suet similarly for consumption in England except that after the clarification process it is forced, when almost set, through a kind of mincer into a small amount of ground rice. This keeps the threads of fat apart and ready for use. Tinned suet for tropical use is 100 per cent. fat and no attempt is made to keep it in tiny particles. By experiments with this suet the writer has found a simple and effective method of making suet pastry. Put the tin of suet on ice for one hour only before required; cut the measured quantity into the flour until the pieces are quite small and then rub the suet into the flour as when making short crust pastry. Proceed in the usual way, and a lighter, more digestible, and finer-textured suet pastry will result than by using the method which must be employed in a cold climate.

The rule of keeping everything as cold as possible does not apply in the making of raised pie-crust or hot-water crust as it is sometimes called. The fat and water are brought to boiling-point and immediately added to the flour, with the result that the starch grains burst and absorb the liquid, a process which in the previously discussed pastries takes place in the baking. Choux pastry used for eclairs, cream buns, aigrettes etc. is made on the same principles as hot-water crust, but the dough is lightened by the slow and thorough addition of beaten eggs, which distribute the air evenly.

Baking powder should not be used in any pastry where the amount of fat is half or more than half the amount of flour. Baking powder has a tendency to produce dry pastry which stales readily. For the same reason, self-raising flour should not be used. The manufacturers of this product, in order to keep their reputation, must necessarily cater for the bad cook who is heavy-handed and possibly has no idea of the methods of incorporating air into her pastry or who does not realize the need of quickly putting it into the oven if it contains a chemical raising agent. Such lack of knowledge must be allowed for and the only way to do so is to provide a large amount of baking powder in the self-raising flour—the pastry will certainly rise as advertised, but it is of inferior quality to a pastry made without baking powder.

No definite quantity of water can be stated as the amount necessary to mix a definite amount of dough, but $\frac{1}{2}$ pint to 1 lb. of flour is sometimes suggested as an average approximate amount although a number of factors affect this. Firstly the absorbing quality of the flour; Vienna flour, for instance, being rich in fine starch is more absorbent than household flour. An increased quantity of butter or the use of eggs decreases the amount of water required. Melting the fat as in hot-water crust; undue friction half melting the fat by excessive rolling or pressure; prolonged contact with hot hands and weather conditions; all tend to decrease the proportion of water.

Methods of Cooking.

The method of cooking depends upon the kind of pastry. Soft fats must have a dry method of cooking such as baking or frying, whereas with suet pastry the moist methods of steaming and boiling may be employed and are in fact

better. Suet pastry may be baked, but suet being a hard fat leaves a residue and the resulting pastry is inclined to be hard; steaming is preferable to boiling as with the latter the gluten cannot be sufficiently blown out by the expanding gas to make the pastry light, owing to the weight of the water surrounding it, with the result that the texture is close. Also, the water being in contact with the pastry causes it to have a sticky surface which is less palatable than a dry one, an ordinary pudding cloth not being water-proof.

Pastry which is baked requires a hot oven so that the starch grains in the flour will burst and absorb the fat before it has time to melt out. At the same time a hot oven is also required to cause the air to expand, the moisture to turn to steam and, with the air, push up the mixture before the gluten sets. Once the gluten has set, the air and steam will not have the power to raise the mixture any further. With pastry which requires long baking the temperature of the oven must be lowered after the pastry (gluten) has set otherwise the surface starch will dextrinize and burn before the inside is cooked.

Principles Summarized.

The principles underlying methods of pastry-making may therefore be summed up as follows:

1. Air and other gases expand upon a rise of temperature.
2. Starch cells of flour when exposed to heat and moisture swell and rupture, and the released starch absorbs the fat.
3. Gluten of flour being an absorbent of water swells and forms a cohesive mass, in which air is entangled. The latter expands when heated and thus raises the pastry and makes it light.

Faults and their Causes.

SUET PASTRY.

Heavy close texture may be due to:—

1. Too slow an addition of liquid.
2. Cooking not started at boiling point thus preventing the starch grains bursting and absorbing the fat which consequently melts out.
3. Too much water used in the mixing. The tenacity of the gluten is weakened thus preventing it from holding the expanding gas when great heat is applied. The gas forces its way through the thin gluten mass and escapes, and the mixture falls.

SHORT CRUST PASTRY.

Hardness may be due to:—

1. Insufficient fat.
2. Uneven distribution of fat giving rise to dry patches.
3. Too much water (as above).

Blisters may be due to:—

1. Uneven or too slow addition of water. The portions with excess water have no flour to absorb it. The additional steam blows out the thin surface layer of gluten and produces a blister.

ROUGH PUFF AND FLAKY PASTRY.

Hardness may be due to:—

1. Too much water (as above).
2. Under or over-rolling giving rise to uneven distribution of fat.
3. Too cool an oven. Fat melts at a lower temperature than that required to burst the starch grains in the flour. If this takes place, the fat melts out and escapes from the pastry thus decreasing the proportion.

PUFF.

Uneven rising may be due to:—

1. Uneven rolling.
2. Uneven heat—great heat on one side of the oven will cause that side to rise rapidly.

Close texture may be due to:—

1. Dough too stiff, and therefore difficult to obtain even distribution of fat in rolling.

CHOUX PASTRY.

Hard outside and soft inside:—

1. Not sufficiently risen due to insufficient cooking of starch in the pan or too much starch to the amount of eggs with the result that the power of the raising agent (air) is weakened.

2. Too hot an oven. The starch dextrinizes too quickly and the gluten sets; the air inside is unable to expand owing to the hard outside and thus the pastry remains soft and heavy.

Reviews.

The Malayan Orchid Review, Vol. II, No. 3

Published by the Malayan Orchid Society. Price 50 cents (Straits)

Until recently the lack of publications, and particularly of periodicals dealing with tropical horticulture has been remarkable. Fortunately there now seems to be a tendency towards a much wider interest in gardening in the tropics generally, evidence of which is seen in the formation of several local gardening societies and in the publication of many valuable articles on horticultural subjects in this magazine. At the same time, there is a natural tendency for enthusiasts to specialize in one group of plants.

Not only in Malaya is this evident. Ceylon, the Netherlands Indies, and Queensland also have specialist societies and it is not surprising that orchids should be the first group of plants to draw enthusiasts together. All but a few require some degree of experience and skill for their management and these orchid societies exist primarily for the exchange of information and the encouragement of the novice by the more skilled members. The most convenient means of exchanging information and experience is through the medium of a regular periodical, and Ceylon, Malaya, and the Netherlands Indies each now has its own publication.

Number 3 of the second volume of the *Malayan Orchid Review*, dated October 1936, is well up to the high standard set by previous issues of this valuable publication. It has the innovation of two excellent coloured plates (*Dendrobium violaceo-flavens*, and the new species *Phalaenopsis Laycockii*), and the general format and quality is of the standard desirable in publications of permanent reference-value. Approximately half the number is devoted to hybrids raised in the East. R. E. Holttum contributes an article on three hybrids raised in Singapore; the new *Spathoglottis* "Jubilee," and two *Arachnis* hybrids of which the bigeneric *Aranthera* Mohamed Haniff (*Arachnis Hookeriana* × *Renanthera coccinea* var.) is a striking new plant. J. C. Nauen gives interesting information about the progress of the numerous seedlings in Singapore, and John Laycock gives notes on four new hybrids raised in Java. As the bulk of orchid hybridization has been confined to half a dozen genera more suited to glass-house conditions in temperate countries than to our local conditions, the production of these hybrids suitable for use as "hardy perennials" under tropical conditions is fascinating work, long overdue. The Singapore Gardens will be the birth-place of some exceedingly interesting and valuable plants during the next few years and it is to be hoped that progress reports of the "children" will continue to be a feature of the Review.

A reprint of a paper on *Dendrobium Phalaenopsis* read by G. Bates to the Queensland Orchid Society gives interesting details about the native habitat of this beautiful orchid which may be of value in its successful cultivation locally.

At least, it tends to confirm the suspicion that excessive moisture is one of the main causes of the deterioration of the plant after a few years in Malaya.

The remainder of the issue is occupied by Species Notes by John Laycock, an article on Some Interesting Malayan Orchids by R. E. Holttum, Notes of Interest to Malayan Orchid Growers, extracts from recent issues of the Dutch publication *De Orchidee* and a review of a recent Dutch publication on orchid pests and diseases.

A noteworthy feature of the Review is its accuracy, not only in nomenclature, but also in proof-reading. A fairly exhaustive search reveals only one small error; an erroneous full stop after "Nellie Sander" on page 132. While agreeing with the editorial comment that more orchid growers should contribute, we feel that the standard set by the main contributors—who are also the Editors—Messrs Holttum and Laycock, is so high that little fair criticism can be made. One small point however, might be considered in future issues: a reference to the original author of botanical names given. This may be a technical point, but it is of special importance in Orchidaceae where many species have carried a multitude of different designations. For example, we note that what is commonly known as *Arachnis alba* (Ridley) Schlechter, the same species as Ridley's *Arachnanthe alba* and *Renanthera alba*, has now re-adopted, on grounds of priority, the original name of *Renanthera Hookeriana* bestowed by Reichenbach, and later transferred to the genus *Arachnis*. To avoid further botanical confusion it would seem desirable to publish such names with authorship in the conventional botanical way—*Arachnis Hookeriana* Reichb.

B. A. L.

Garden Book of Barbados

Published by the Department of Science and Agriculture, Barbados, 1935.

This is a book of 153 pages, the greater part of which consists of brief descriptions of individual plants cultivated in Barbados, with notes on their growth and treatment. There are brief introductory chapters on climate, soils, and pests, and a very full index at the end of the book. It is clearly a very valuable publication for residents of Barbados, and we welcome it as another indication of the development of interest in tropical horticulture.

The climate of Barbados is a few degrees cooler than that of the lowlands of Malaya, and distinctly drier, with a more definite sequence of seasons, though still on the whole very equable. The soils are all derived from limestone, and are thus different from most Malayan soils. These differences are seen reflected in the behaviour of plants. Most of the trees are more definitely seasonal in flowering than in Malaya. A good number of plants (including *Petrea* and *Congea*) produce seeds in Barbados and not in Malaya. Some plants requiring drier conditions (*e.g.* *Pelargonium*) are obviously easier to grow in Barbados,

and some of the common Malayan plants (such as the sealing-wax palm) are omitted and probably not easy to grow in Barbados.

One great use of a book like this from the other side of the world lies in the information it provides about plants grown there but not in Malaya. As one looks over the pages of the Barbados garden book, one finds that familiar names are in the great majority, but there are a few names still unknown in Malaya. Such plants are obviously worth trying here, and we hope to secure some of them, but when there is a remark "propagated by cuttings," the introduction may not be very easily effected. One at least, the white Petrea, should be very useful.

R. E. H.

Selangor Gardening Society.

QUARTERLY NOTES

Talk by Mr. C. L. Newman.

A meeting of the Society was held at Mr. E. D. Butler's house on Tuesday October 7th, when Mr. C. L. Newman gave an interesting talk on the "Scientific Aspect of Gardening." Mr. Newman explained various plant-structures and properties of soils with the aid of a micro-projector and slides, and gave some interesting demonstrations. The Society is indebted to Mr. Newman for a carefully prepared talk on a subject which has hitherto received little attention in the Society.

Annual General Meeting.

The Annual General Meeting of the Society was held in St. Mary's Parish Hall on Wednesday, November 18th, at 7 p.m. with Mr. E. D. Butler in the chair. In presenting the Report and Accounts Mr. Butler reviewed the activities of the Society during the year, and stated that the year had been successful although, owing to a revision of the list of membership, the number of members on the books showed a slight decrease. The report and accounts were unanimously adopted.

Officers elected for the year 1937 were as follows;—

President, Mr. E. D. Butler, *Hon. Treasurer*, Mr. A. Arhuthnot, *Hon. Secretary*, Mr. B. A. Lowe, (Department of Agriculture), *Committee*, Mrs. Butler, Messrs. King, Eu Kee Eng, Colomb, and Choo Sze Foong.

Award of Challenge Cup for 1936.

At the meeting of the Committee held on October 6th, the Challenge Cup of the Society was awarded to Mr. E. D. Butler as the winner of the largest number of prizes at the flower-show held in 1936.

Importation of Planting Material.

During December, arrangements were made to import Dahlias, Gloxinias, Gladioli and other suitable planting material at a cheap rate for members. It is hoped that the tubers and corms will arrive in time to flower for the forthcoming show.

Flower-Show 1937.

While a precise date has not yet been fixed for the next flower-show, it will probably be held about the end of March. Members of the Society will be informed as soon as a date has been fixed, in order that plants may be in a suitable condition for showing.

B. A. L.

Singapore Gardening Society.

QUARTERLY NOTES

We are very pleased to announce that Lady Thomas has kindly consented to become Patron of the Society. The following is a brief report on the Society's activities during the past quarter.

Flower Show. The Society accepted the kind invitation of the Singapore Flower Show Committee to collaborate with them in organizing the 1937 Flower Show.

Sub-Committees. Two new sub-committees were formed:—

1. The Exchange and Barter Committee, to deal with all matters in relation to purchasing and exchanging plants and planting material. So far the activities have been somewhat limited, but under the guidance of Mrs. W. Rose, an energetic worker, great things are expected in the near future.
2. The Questions Bureau, to deal with all queries pertaining to to gardening matters.

Membership. At the end of November the active membership of the Society was increased to ninety.

Meetings. In October an extremely interesting address on "Garden Planning" was given by Mr. F. Flippance, Waterfall Gardens, Penang. So little has really been done in the way of "planning" in Singapore gardens that Mr. Flippance's address was of particular help and value. In November, Mr. John Laycock entertained members by an excellent résumé on the various kind of orchids suited to local conditions. In December, an excellent and most helpful address and practical demonstration on "Flower Arrangement" was given by Mrs. H. R. Arbenz. Some of the decorations shown by Mrs. Arbenz were very praiseworthy.

Exhibits of interesting plants and flowers were staged at all meetings.

Provisional Programme, January to June, 1937

11th January ..	Mr. L. A. Logan Richardson:	..	"Mixed Borders."
8th February ..	Floral decorations competition:	..	Social Meeting.
8th March ..	Mr. W. Birtwistle:	..	"Water Gardens."
12th April ..	Discussion on Flower Show.		
10th May ..	Miniature gardens and plants for the house: exhibition and discussion.		
14th June ..	Rev. Nigel Williams:	..	"Gardening Geography."

J. C. N.

THE M.A.H.A. MAGAZINE

APRIL, 1937.

EDITORIAL.

The reception accorded to the January issue with its new cover design was most gratifying and distinctly encouraging. Several readers were good enough to write and express their appreciation, and quite a respectable number of new subscriptions has been received.

The number of leaflets returned with the names of other possible subscribers was perhaps disappointingly small, but to those who did help in this way we take this opportunity of tendering our very grateful thanks. We enclose a further leaflet with this issue, and appeal to *all* readers to give us their assistance as far as possible.

We have the promise of several interesting articles for later issues which we think will prove to justify new subscribers in the modest outlay involved for the annual subscription. While on the subject of future material, we would again draw the attention of our readers to Miscellaneous Horticultural Notes, and remind them that these form a feature which can be developed into a really valuable record of Malayan gardening knowledge if they will contribute accounts of their own experiments and efforts in their gardens, and notes of any horticultural interest.

Imports of Fresh Flowers.

While looking through the summary of Malayan imports and exports for 1936 we were somewhat surprised to observe the considerable increase in the import of fresh flowers. Last year the value of imports had risen to \$15,195 from \$9,068 in 1935, the figures for 1933 and 1934 being respectively \$6,046 and \$7,829: the peak year was 1931 when imports were valued at \$20,000.

The sudden increase in 1936 is obviously related to returning prosperity, in particular of Singapore, to which city almost the whole of the imports are consigned, but it rather implies that advantage has not been taken of the opportunity to develop sufficiently the local industry.

The question of transport undoubtedly has to be taken into consideration, since the air services from the Netherlands Indies obviously provide facilities not available in the case of Cameron Highlands and Fraser's Hill. This advantage should not, however, prove an insuperable difficulty to our local commercial horticulturists, and we commend to them the consideration of this potential market in Singapore, with its future possibilities of increasing far beyond the figures quoted above.

**The Fourteenth
Malayan
Exhibition.**

The annual Malayan Exhibition is once again drawing near, and the Malayan Agri-Horticultural Association is now well in the throes* of organization. One of the annually recurrent miracles of this exhibition is the amazing amount of work put into it by the large body of voluntary workers recruited each year: we have so often, in this place, stressed the value of these Shows to Malaya that we feel sure that these workers get their reward in the satisfaction of a job well done, and in the feeling that their work is of practical benefit to the country.

Full particulars of this year's Exhibition can be obtained from the secretary of the Association, 8, Barrack Road, Kuala Lumpur.

**Sketching as
a Hobby.**

The article on sketching included in this issue has been submitted by its author with considerable diffidence, but we welcome it, particular in view of the approaching Malayan Exhibition with its ever popular Art Section.

While it is probably true that a large number of amateur efforts at art, as in most things, should be for private "consumption" only, it is equally true that such a hobby can be extremely fascinating, broadening one's general outlook, and forcing one to look at familiar sights from a new angle, that of picture making.

**Daffodils in
Malaya.**

We would draw particular attention to the short article in this number recounting a successful attempt to grow daffodils in Kuala Lumpur. We can vouch for the veracity of our contributor (!) as we have one of the plants in flower before us as we write; it is one of the smaller ones, 9½ inches in height, with a small flower but an-unmistakable perfume, and—it is delicately beautiful.

A purist friend to whom we showed these comments objected to the linking of the Association and "throes," complaining that the latter word referred to the pangs of childbirth. We maintain, however, that the word is singularly appropriate!

horticulture.

A METHOD OF INDUCING DAFFODILS TO FLOWER IN MALAYA

While the London market for early spring flowers is largely supplied from the Scilly Isles, Cornwall, the Channel Islands and the South of France, considerable quantities of forced daffodils, narcissus, tulips and other bulbous flowers are grown nearer the market by a process of forcing. This consists essentially in rooting the bulbs out-of-doors or in a cool frame at a comparatively low temperature, and of forcing them into bloom in hot-houses as soon as shoots appear.

Acting on this procedure, Mr. A. H. Millard, of Kuala Lumpur, has succeeded in growing and flowering excellent daffodils with practically complete success. He received a dozen bulbs of an unnamed variety of daffodils just after Christmas, 1936, and during the first week in January potted them singly in 4-inch pots in a mixture of coconut-fibre and charcoal. One of the plants which was kept at normal temperature rotted within a week. (Mr. Millard has had similar experiences before with daffodils, crocus, tulips, hyacinth, scillas and snowdrops). The remaining eleven were placed in a refrigerator after watering lightly, and left at a temperature of about 40°F.

About February 15th, one of the bulbs was carefully lifted and found to have commenced rooting satisfactorily. Rooting having been achieved, all the plants were removed from the refrigerator each afternoon and returned in the morning in order to lessen the shock of complete removal. This continued until March 19th when the first shoots began to show above the soil. The pots were then removed from the refrigerator entirely. Subsequent growth was amazingly rapid; within four or five days shoots had elongated at the rate of an inch a day and flower-buds appeared on several plants by March 26th.

On April 1st, the first flower opened and proved to be a rather small but very delightful double variety. Since then, up to the date of writing (April 8th) seven buds have opened and further buds are expanding rapidly. Four of the bulbs have two flowers each, three one each, and four have not yet developed buds though from their appearance there seems no reason to doubt that they will flower within the next week or so. Thus, from eleven bulbs, eleven flowers are certain, and there will probably have been fifteen or sixteen by the time flowering ceases.

The flowers are approximately two inches in diameter and two inches long. They are carried on stems almost a foot high and have the clean fresh smell of spring daffodils. They last four or five days in Kuala Lumpur, kept continuously at room temperature.

The success of this little experiment opens up interesting possibilities of growing and forcing other spring bulbs. It should be comparatively easy to design a container which could hold a considerable quantity of rooting bulbs and

at the same time keep the temperature sufficiently low by the daily addition of ice to obtain supplies of English spring-flowers at a reasonable cost.

Mr. Millard, to whom the writer is indebted for particulars of the experiment, intends to extend the process to other bulbous plants, and it is to be hoped that further successful results will be obtained in due course.

Summary.

1. Daffodils arrived by parcel post at the end of December, 1936.
2. Planted in fibre and charcoal, placed in refrigerator at about 40°F. during the first week of January, 1937.
3. February 15th to March 19th Temperature of 40°F. from 8 a.m. to 4 p.m. and kept at room temperature (about 75°F.) from 4 p.m. to 8 a.m. daily.
4. March 19th. Shoots showing above soil. Plants removed from refrigerator entirely and kept at room temperature.
5. April 1st. Flowering commenced.

B. A. L.

NEW OR INTERESTING ORNAMENTAL PLANTS

BY

R. E. HOLTUM, M.A., F.L.S.,

Director of Gardens, S.S.

Adenium coetaneum.

Seldom has a more striking horticultural novelty appeared in recent years in Singapore than this species from East Africa. About the beginning of 1936 a plant was brought here by a Japanese on one of the ships calling at East African ports, and was acquired by a Singapore nurseryman, who brought it to me for identification. The aspect of the plant was that of a miniature Frangipanni, but with even more fleshy trunk, and the flowers a very brilliant rich crimson-pink in colour. On consulting the *Flora of Tropical Africa*, I found the name of the plant, and from the recent book on Gardening in East Africa (reviewed in this Magazine Vol. V p. 69) I discovered that it is cultivated there, though I cannot find a reference to its cultivation in other parts of the tropics. It is not mentioned in Bailey's *Cyclopaedia*.

The genus *Adenium* (from the Greek word meaning gland, owing to the glands at the bases of the leaves) has about 12 species, extending from Arabia to South Africa. *Adenium coetaneum* (meaning "of the same age"; this refers to the fact that flowers and leaves are borne together, whereas in an allied species the flowers only develop after the leaves have fallen) is native in Kenya, Uganda and Tanganyika Territory. It is said to grow in "arid country from the coast to 3000 ft." and can be cultivated in "warm dry places up to 6000 ft., remaining small but flowering freely." It is surprising that a plant native of such a dry climate should thrive in Singapore. Probably it would not succeed at all well planted in the ground, except in sandy soil; but as a pot plant it is excellent, growing easily and flowering freely, standing the full force of the wet season in Singapore without showing any signs of distress.

The size of the plants at present existing in Singapore does not exceed about 18 inches; the full height in its native home is said to be three feet. The base of the trunk of a plant 18 inches high may be six inches thick. The branches are nearly as thick as one's finger, green and succulent. The leaves are up to 4 inches long and 1½ inches wide, broadest near the tip. The flowers come in small groups at the ends of the branches; they have a funnel-shaped base an inch or so long, and round the mouth five rounded petals about an inch long. Each flower lasts about eight days, or possibly a little longer.

The plants can be propagated by cuttings or by marcots, the latter being slow to root. The cuttings must be kept rather dry until they start new growth, otherwise they may rot. Once established, the plants are very hardy. Needless to say, they need the full sun, and a well drained soil. I cannot find record of any native or English name. The flowers are so beautiful that they deserve some picturesque and appropriate epithet.

Phaleria Blumei.

Here we have another plant little known in horticulture in any part of the world, yet well deserving attention. The genus even is not mentioned in Bailey's *Cyclopaedia*. It belongs to the family Thymeleaceae, and is allied to the genus *Daphne*, which provides some very beautiful plants for temperate gardens. I know of no local names. The name *Blumei* seems open to a little doubt, as there are several allied species of *Phaleria*, and it is difficult to be sure to which species some of the older names and descriptions apply. The generic name *Phaleria* was given by William Jack, surgeon in the employ of the East India Company, on the staff of Raffles. *Phaleros* is a Greek word meaning "having a patch of white" (from *phalos*, white), and refers presumably to the white bunches of flowers among the leaves. The name *Blumei* commemorates C. L. Blume, a celebrated Dutch botanist who wrote many works on the plants of Java.

Phaleria Blumei is a shrub (said to reach the size even of a small tree) native of Java. It has rather the appearance of an *Ixora*, on account of the opposite simple leaves and the compact bunches of flowers, but the leaves are more drooping than those of *Ixoras*. The flower structure is however quite different, and without flowers *Phaleria* may easily be distinguished by the absence of the stipules which unite the leaf bases of *Ixora* and other Rubiaceae. The leaves are rather dark green, shortly stalked, narrow at the base, the apex suddenly produced into a short sharp point, about 4 to 6 inches long and 1½ to 2 inches wide. The flowers are in small clusters in the axils of the leaves, and on the old branches from which the leaves have fallen. The bunches are smaller than those of an *Ixora*, but the individual flowers are much the same size, of a very pure white; the bunch has only a quite short stalk, so that it lies rather amongst the leaves. Each flower consists of a slender tube up to 1½ inches long with four "petals" at the end. The "petals" are really sepals; for some reason or other the petals of *Phaleria* have hardly developed at all, which is also the case in *Daphne*. There are eight stamens, joined to the tube and protruding from the mouth, and a small round stigma. The flowers are succeeded by fleshy bright red fruits of rather irregular shape, half an inch or so in diameter. Seeds are freely produced, one or two in each fruit.

The bushes grow about as fast as an *Ixora*, and flower freely and quite frequently from a height of two feet onwards. The flowers unfortunately last only a few days, but while they last they are very beautiful. The chief disadvantage of this plant from a decorative standpoint is the fact that the flower bunches are on very short stalks and do not stand well away from the leaves; this makes them less useful also for cutting. But the brilliant white branches show up quite well, and there is no other shrub of this character with really good white flowers. The flowers share with those of *Daphne* an indefinable daintiness which is very attractive. Propagation from seeds is easy. Cuttings will probably grow also, but we have not tried them.



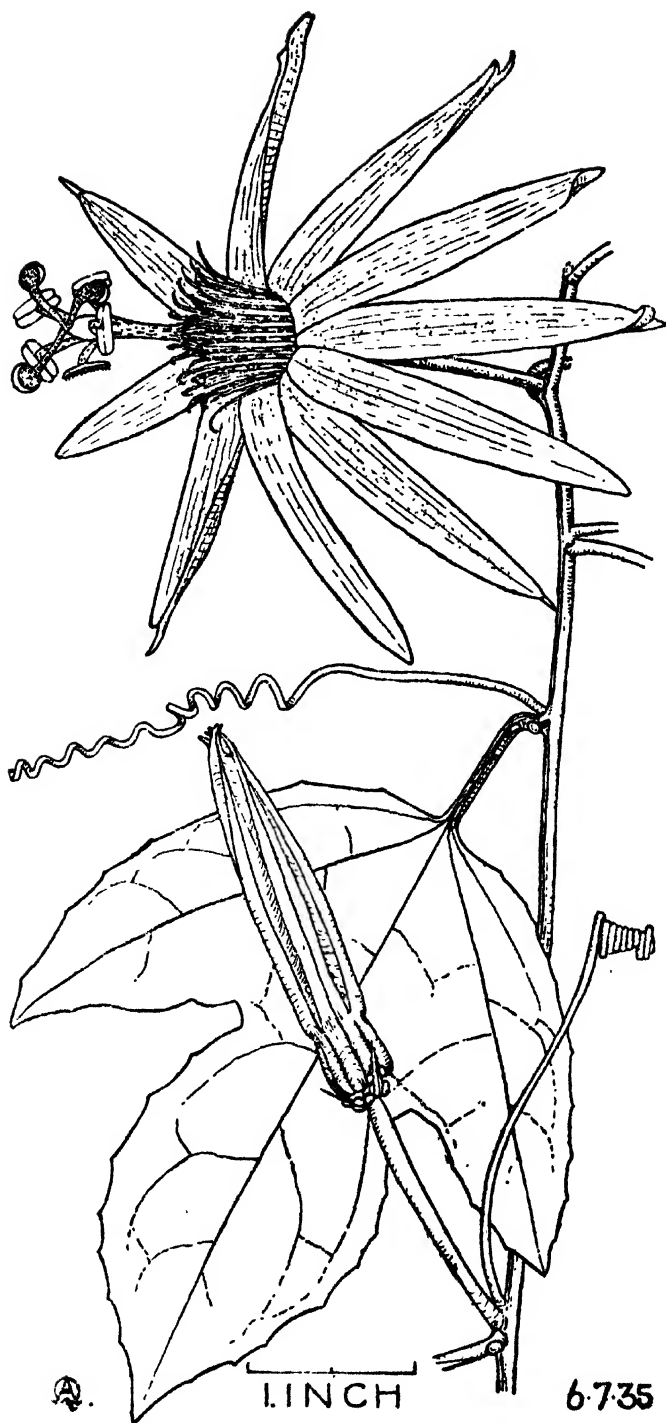
Phaleria Blumei.

***Passiflora quadriglandulosa.* The Pink Passion Flower.**

This passion flower is fairly common in Malayan gardens, but should be still better known, and is certainly of sufficient interest to warrant inclusion here. It has usually been known as the pink passion flower, or the pink Tacsonia, and I have been in doubt as to its botanical name. It seems fairly clear, however, that it is *P. quadriglandulosa*, a species described from the West Indies over a century ago, and introduced to cultivation in European hot-houses about 1850. It was well illustrated, but under the wrong name of *Tacsonia sanguinea*, in the *Botanical Magazine* in 1852. It is characterized by the large pink flowers with long narrow petals, well shown in the accompanying drawing, for which I am indebted to Dr. G. A. C. Herklots. The plants are easy to grow and flower freely in Malaya.

Passion flowers have a very curious form, which has led to many stories concerning the significance of their parts. These stories date from the beginning of the 17th century, when an Augustinian friar from Mexico brought a drawing of the flower to Giacomo Bosio, who was writing a treatise on the cross of Calvary; an account of the matter is given in Bailey's *Cyclopaedia*. The drawing shown to Bosio was of course rather fanciful, and enabled the crown of thorns, the nails, the scourge, the five wounds and other symbols to be seen. The botanical significance of the structure of the present flower (which agrees in essentials, though not in detail, with other passion flowers) may be briefly described. At the base of the flower are three small *bracts*, with large glands on either side (whence the name of the species). The bottom of the flower is in the form of a cup, at the top of which the petals and sepals are attached. There are five sepals, each with a short green horn-like appendage at the top, and five petals alternating with them; when the flower is open, petals and sepals are closely similar and a careful examination is needed to distinguish them. Within the throat of the flower, at the base of the sepals and petals, is the *corona*, consisting of three rings of filaments, the innermost partly united into a short tube, clasping the central stalk. In the centre of the flower rises the stalk which bears at its apex first the five large stamens and above them the ovary with its three stigmas (the nails of the cross). The flowers rarely produce fruit in Singapore, perhaps partly because they are not usually pollinated. I have seen two or three fruits; they are green, something like a *buah susu* but much smaller, with a thin skin. The bottom of the cup of the flower is filled with sweet nectar, which is sometimes sought for by sunbirds and also by monkeys. The sunbirds pierce the cup with their beaks, and the monkeys pluck the flowers and suck the juice; thus neither of them serve the plant by effecting pollination, which in its native country is probably carried out by humming birds.

The leaves of the plant are either three lobed, (as in the drawing) or simple; the edges are irregularly toothed. There are two glands at the base of each leaf-stalk, and sometimes one or two higher up; also glands on the leaf margin, between the lobes. In the axils of some of the leaves are tendrils, which are twisted into a spiral; these hold the plant to its support.



Passiflora quadriglandulosa, The Pink Passion Flower.



S. 9-8-35

Quisqualis indica.

The plant is easy to propagate from cuttings. These may take some little time before they start vigorous growth, but once growth begins it is very rapid. The leafy climbing stems make a very effective screen when trained on to a suitable support. Their chief disadvantage is that they tend to become bunched together at the top of the support. The flowers are produced freely throughout the year. They open about mid-day and remain open until evening; next day they wither and new flowers open.

There is an allied species called *Passiflora vitifolia* with brilliant red flowers, which have much larger bracts beneath them. This species grows quite well in Singapore, but flowers very rarely. It flowers quite well, however, on Penang Hill, and is a very handsome climber, well worth growing at hill stations.

***Quisqualis indica.* Rangoon Creeper.**

This vigorous climber is distributed from Burma southwards and eastwards throughout the Malayan region. It is not a common native plant in the Peninsula, except in the north and on the east coast. As a garden plant it is fairly common, but perhaps a note about it will be of interest here. The accompanying drawing, for which I am indebted to Dr. Herklots, shows leaves and a group of flowers, from which the plant will be readily recognised.

The name *Quisqualis* was given as long ago as the late 17th century by Rumphius. Seeing that the plant started as a shrub and then put up a long climbing shoot on which the leaves were differently arranged, Rumphius remarked that the name should not be *Udani* (as known to the natives) but *Hoedaniq* (a Dutch word meaning "of what sort") which he latinised as *Quisqualis*. An alternative English name is Drunken Sailor; I do not know the origin of this name nor why it was given. The Malays know the plant well for its medicinal uses, and call it *Dani*, or *Udani* etc.

The leaves of *Quisqualis* are usually in opposite pairs, but on long climbing shoots they are often not quite opposite. The leaves are simple, a little hairy beneath, rounded at the base and pointed at the tip; they are reddish when young. The flowers are in dense clusters at the ends of the branches and in the leaf axils. The calyx forms a long slender tube, the small free sepals at the top of it hidden by the larger petals. The flowers open white and gradually change to a deep crimson. The change seems to occupy two days. They are very fragrant, especially at night. The fruits are dry, and of a curious shape, with five longitudinal wings. They are rarely seen on cultivated plants in Malaya.

Quisqualis is sometimes slow in becoming established, but once well started in growth it is very vigorous, and indeed difficult to eradicate as it produces many root suckers. Root suckers are also the easiest method of propagation. In Singapore it seems to be deciduous, the flowers coming with the new leaves after a short bare stage. I have no records of the frequency of flowering, but believe it to occur every few months. Information on this point from readers would be welcome.

MIXED BORDERS *

BY

L. A. LOGAN RICHARDSON.

Superintendent, Johore Gardens.

In choosing the site for a mixed border of shrubs and herbaceous plants it is advisable to keep as far as possible from large trees and hedges as the roots of these will very quickly grow into the new tilled and manured soil of the border to the detriment of the shrubs etc. The next business is that of testing the soil on the chosen site, and finding how much work is required before it will be ready for planting. This depends a great deal on whether one has a suitable soil favourable for the deeper rooting shrubs, that is, a well-drained soil, on the heavy side rather than sandy. In that case deep digging with an application of stable manure or artificial manure might suffice. However for the most part, a well drained and fertile garden site is a rarity in Singapore, unless one is fortunate enough to have a house built, say on an old Chinese vegetable garden.

Should the soil be too light and sandy without any signs of humus, it would be advisable, most certainly, to dig in as much humus as possible, such as grass cuttings, leaves, and if at all available animal manure, and the following artificial manures:---

Bone meal at the rate of 4 ozs. to the square yard.

Christmas Island phosphate 4 ozs. to the square yard.

If on the other hand the ground be too heavy and inclined to flooding during the rains, drainage should be provided. This can be done by merely opening a trench to a depth of 1½ to 2 feet and filling about 6 to 9 inches with broken brick, stones, old tins, etc.; in fact a drain can often get rid of a lot of rubbish like broken bottles and old iron which are not always easily disposed of. The trench can afterwards be filled in with soil, and will remain effective until it becomes blocked up with silted soil and requires to be opened up, cleaned and renewed. The drain should be placed if possible in front of the bed, say in the centre of the footpath, if the border be so placed, so that should it be necessary to modify the drainage in any way it will not be necessary to disturb any of the subjects in the border.

I would like to stress the point of good drainage, as in my experience of gardening in Malaya I have seen more plants die in flooded ground than from any other cause.

To help towards lightening a heavy and unworkable soil, sand can with advantage be used. I use all the road sweepings that collect after heavy rains for this purpose as these are particularly gritty. Again, this type of soil will benefit with liberal supplies of animal manure, leaves or grass cuttings dug into the ground under treatment, with also the previously mentioned artificial manures such as bone meal etc.

A word regarding the humus resources available in, I should imagine, all of your gardens might be of value here. Firstly the cuttings from the grass,

* A Lecture given to Singapore Gardening Society, 11th January, 1937.

which incidently one considers such a nuisance in requiring cutting so often. Most of the kebuns burn this, I think, and with it the leaves they sweep up each day. Instead of making a funeral pyre of this excellent source of humus, make the gardener spread the leaves out on the ground in an orderly square, say about 6 ins. to 1 ft. thick and keep adding each day's sweeping and grass cuttings, layer by layer until the heap is about 3 ft to 4 ft. high. Then commence a new heap in the same way. After each completed heap has stood for about a month, get the gardener to pull the heap to pieces with his digging fork and rebuild it having completely mixed up the fermenting grass and leaves. A little sulphate of ammonia sprinkled over each layer as the heap is turned over and rebuilt, not only adds to the manurial value of the humus, but facilitates the decomposition. Not only does this prove valuable for the making of new beds and borders, but it is splendid for top dressing shrub borders, hedges, and any other established plants which need feeding. Another source of humus which is available to everyone in Singapore is that delivered by the Municipality from the Sewerage Works in Alexandra Road. To some it may seem objectionable to have applied as a top dressing direct on to the shrub borders and beds, but this can be avoided by having it stacked for a few weeks, layer on layer, with ordinary soil and having it eventually well mixed before using as a top dressing. However if one is applying it direct to a new shrub border it can be dug in deeply at once, and I don't think the most sensitive of noses could detect its existence.

Now having decided upon the site, fertility, and necessary treatment, we must consider what we are going to plant it up with. Maybe our object is to screen off some unsightly view, or to enlarge the interest of the garden by screening off one section from another. On the other hand we may require to fill a border with low growing shrubs and other plants to get away from the persistent obligation nearly all of us owe to the ever ready canna, without going to the bother of continually worrying over future plants, for a border of the more temporary annuals.

Mixed borders are really for the busy person who requires flowers and colour all the year round with a minimum of labour and planning. Both the shrubs and the other plants used to furnish the border can be selected from subjects suitable for cut flowers for indoor decoration, and one can easily arrange such a selection that flowers can be obtained at every period of the year.

Where a border is only to be seen from one side, the tallest subjects must for the most part be placed in the background. However in the case of a border which has to be seen from both sides, the taller growing shrubs should be planted towards the centre. Regarding the planting of shrubs, one usually finds that one plant will be sufficient in each position, though in the case of some of the smallest subjects, two or three planted in a group would give a more effective splash of colour. The smaller herbaceous patches, (and if included, the annuals) should contain, according to their habit of growth, from three to six clumps.

It greatly facilitates the business, and I might say also adds to the pleasure

of making a mixed border, if one prepares beforehand the scheme one visualises by putting it on paper. In one's imagination a border grows, "the like of which has ne'er been seen before," and which will be the admiration of all our friends and the envy of those who merely drop cards. So I say, when you are suddenly filled with a desire to change the scenery in your garden and wish to put in a shrub or mixed border, first of all try it out on paper. It is not necessary that one should be an artist, or a landscape gardener, one merely requires a piece of paper of an appropriate size for the scale you intend to use. Rough out the shape of the bed or border you intend planting and put in the various measurements, and from that you will be able to decide what scale will be most suitable. When I can manage it I use for a shrub border 2 ins. to the yard, as this is easier to handle when planting out. The outline having been made out to scale, the entire area is then marked off in one yard squares, and on this, the positions for each individual shrub or patch of herbaceous plants is marked. Step by step one can plan the floral arrangement and colour scheme that one wishes later to plant.

For the main spaces plants should be chosen of bold and striking beauty, but as a border of all large plants would tend towards a monotony of outline, it is necessary to plant groups of smaller shrubs in line with the larger subjects. In Malaya, more than in, say, England, it is necessary to plant with an eye to the colour harmony, for most of the subjects at our disposal flower continuously throughout the year, and therefore can so easily clash with a rival we may have planted nearby.

With the Singapore Botanic Gardens so handy for any who contemplate making a mixed border or for that matter any type of flower border or bed, it should be possible to study the individual specimens in flower and thus avoid colour effects which might make the artist in us shudder.

Each kind of plant in the mixed border should stand in a bold group, and the groups differing in size and shape according to each particular subject should be placed carefully in sequence of colour.

Some families of plants, especially those whose beauty is in their infinite variety, may be used to greater effect in a border by themselves undisturbed by the attraction of other genera, and I hope some day to make a shrub border entirely of Hibiscus, or almost entirely of Hibiscus, as I believe if made sufficiently large it would prove really attractive.

The pruning of a shrub border in this land of perpetual growth is largely a matter of keeping the subjects within bounds, and not allowing them to overcrowd their neighbours. All dead wood must be cut out as soon as noticed. Some shrubs such as Vitis, Oleander, Pride of Barbadoes, (*Caesalpinia pulcherrima*), Pagoda flower (*Clerodendron paniculatum*) should be cut back at the end of each flowering period, while such as the various Lantanas, *Kopsia fruticosa*, *Barleria* species, *Thunbergia erecta*, and *Thunbergia affinis* would be better only cut back when exceeding their allotted space. At all times when pruning make a clean cut, close above a healthy outward growing bud, and endeavour to maintain a form which develops the natural beauty of the shrub and prolongs its flowering life. The subject of pruning of shrubs could provide

in itself quite an interesting lecture, but I will only add that most of the sickly and unsightly specimens one so often sees could be avoided by timely pruning and improved by really hard and judicious pruning. By pruning a sickly or old plant hard back to only a few buds, its strength is concentrated into these buds and new more healthy and vigorous growths are formed.

In Singapore, a shrub border should be replanted every two or three years; however, a great deal depends on the subjects used and their distribution in the border, and whether herbaceous and annual plants are used in the front. If this replanting is not done the stronger growing plants encroach on their weaker neighbours, often killing them outright.

A word on staking will not be out of place, for on the neatness and care with which this is done, in a very great measure depends the satisfactory appearance of a border of this sort. But as I have already stated, a mixed border being essentially a busy person's excuse to leave well alone, never stake more than is absolutely required. Nothing looks more unnatural than a procumbent plant tied up to a stake, and nothing worse than to see a hefty pole used where a bamboo cane would do, or a stake protruding itself on our notice as is so often the case when the kebun does the job.

The Control of Pests in Shrubs.

This really should be left to an entomologist or more expert authority, as I am not very familiar with all the pests that browse on our favourite specimens, though I see the results on all sides as I go round the gardens. Much, however, can be done with spraying if one considers the trouble and expense worth while. This one must decide for oneself, for some initial outlay is necessary and sometimes the garden's size does not warrant such expense. Mealy bug, scale, and the various leaf-cutting insects can be kept under control with the following if applied about once a fortnight:—

$\frac{1}{4}$ pint "Clensel"; $\frac{1}{8}$ pint nicotine: 2 ozs. "Dutox" mixed together well in 2 galls. of water, then sprayed carefully so that all the branches and leaves receive a protective covering. I use a "Four Oaks" Knapsack sprayer, similar to that used by the Health Department for the oil spraying of mosquito-infected areas, as I find this is much more economical in application and much quicker when large borders have to be tackled. In the small garden either an ordinary syringe or the slightly more expensive Solo sprayer will be found to answer the purpose.

The "Clensel" can, I believe, be obtained at most of the stores in town but the nicotine would have to be obtained from the Imperial Chemical Industries who also supply the "Dutox." In using this mixture and in preparing it try to inhale as little of the fumes as possible because the nicotine will get into one's stomach and may cause sickness. I have already been caught in this country when I first started using this mixture, and for some time did not realize what was the matter with me until I remembered working with the stuff at the Royal Botanic Gardens, Kew, and remembered the effect it had on all of us there. As "Dutox" is listed as a poison one must be careful to wash the hands after spraying; it is also essential to see that the kebun is carefully instructed about this.

CRAZY PAVING IN MALAYA

BY

J. C. NAUEN,

Botanic Gardens, Singapore.

Garden walks are a feature of the garden which is only too often neglected, yet they are of considerable importance not only from a serviceable point of view, but as a basis on which most garden planting is founded. Permanency should be of primary consideration in building; initial costs should not be considered prohibitive unless equal consideration has been given to the expense of maintaining poorly constructed paths.

Walks are of various kinds, but it is considered that flagstone walks, made of cement, are the most serviceable. The flags should be from two to three inches thick and should be laid on a sub-base of cinders not less than four inches thick with an inch or so of sand acting as a cushion between the flags and the cinders. After the flags have been levelled and firmed, the joints are pointed with mortar. The size and shape of the flags depends upon the individual taste.

In recent years it has been a practice to break up the flags and lay them at random, filling the joints with a mixture of earth and sand and planting dwarf growing plants at intervals—a practice known as “crazy paving gardening”—thus improving the aesthetic view point of the flagstone walk.

A “crazy paving” pathway, as described above, was built a little over twelve months ago at Government House, Singapore, and has proved most successful, and it is only a matter of time before this type of walkway becomes quite popular.

The plants used in the planting of the pathway at Government House were mostly well known local plants, several of which are found quite plentifully, and considered “weeds”, in most lawns, but which, when planted out individually are quite attractive and compare very favourably with many alpine and rock garden plants grown in more temperate climates.

One very striking point was observed with regard to the behaviour of the plants grown in the walkway that, almost without exception, they grew more compact and flowered for a much longer period than under usual conditions. This can be attributed to two things; firstly that the plants were grown under much drier conditions, and secondly that they were exposed to more brilliant light; both points are well known to influence the growth and habit of plants to a large extent.

The following plants are considered suitable for planting in crazy paving in Malaya; many other dwarf growing plants are also well worth a trial.

Portulaca grandiflora “Garden Portulaca.”

A dwarf plant, growing about 6 inches high, bears flowers, one or more inches across, for several months. The majority of the flowers are in bright shades of rose, red, yellow and orange, also white, in both double and single

forms. The plants are easily grown from seeds. The flowers of this and the other *Portulacas* are only open during the brightest part of the day.

Portulaca pilosa. "Shaggy Garden purslane."

A more robust growing plant than the *P. grandiflora*, but of similar height; bears numerous rose-purple flowers, about $\frac{3}{4}$ inch across. Propagated by seed and cuttings.

Portulaca sp.

A prostrate and wide spreading plant, bearing small yellow flowers. Propagated best from slips or cuttings. This plant is a common garden weed.

Portulaca sp.

A more compact growing plant than the former, growing three to four inches high; bears numerous bright yellow flowers, each $\frac{1}{2}$ inch wide. Propagated by seeds and cuttings.

Alyssum maritimum. "Sweet Alyssum."

A dwarf perennial, but usually grown as an annual, bearing numerous small, sweet scented, white flowers. Propagated by seeds.

Salvia farinacea.

A perennial plant growing to one foot high in the crazy paving and bearing numerous blue flowers for many months. Propagated by seed or by cuttings. There are white and dark blue coloured varieties.

Zinnia linearis.

A dwarf, yellow-flowered *Zinnia* which makes a compact little plant in the crazy paving not more than 6 inches high. The flowers are borne in profusion and last for a considerable time. Propagation by seeds.

Hymenatherum tenuilobum.

A dwarf and compact plant, 6 inches in height, with feathery leaves and yellow daisy-like flowers. Propagated by seeds. (See *M.A.H.A. Magazine*, Vol. IV, p. 221).

Creeping Aster.

A strong growing member of the Daisy family with white flowers. Under normal conditions the plant suckers and roots along its stems at intervals and covers quite an area in a short space of time. When planted in the crazy paving, its rather rampant habit is restricted and it forms graceful clumps. Propagated by cuttings.

Aster sp.

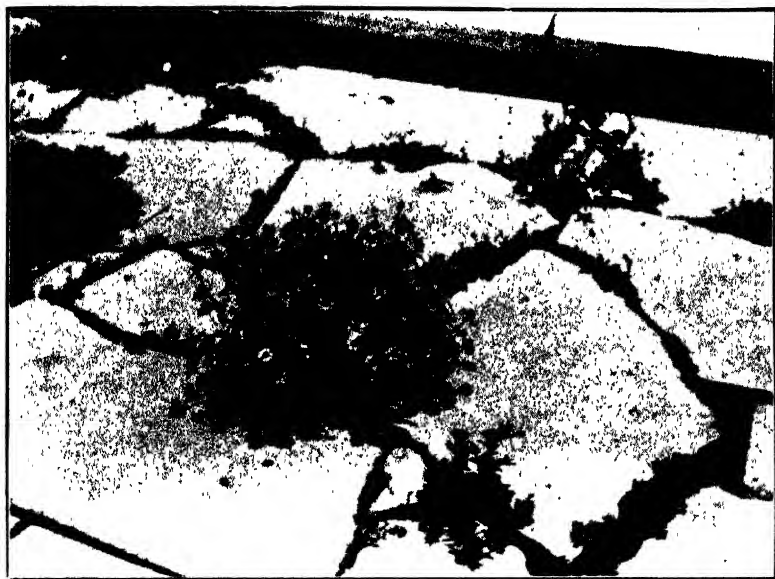
A compact growing perennial with light blue flowers. Under normal conditions it will grow to nine inches high, suckering freely; the crazy paving however restricts its habit but induces it to flower freely. Propagated by suckers.

Verbena tenera.

A prostrate plant not growing higher than six inches. Its leaves are much smaller than the garden verbena. The flowers are rose-violet in colour and are borne in terminal clusters. Propagated by cuttings.

Torenia polygonoides.

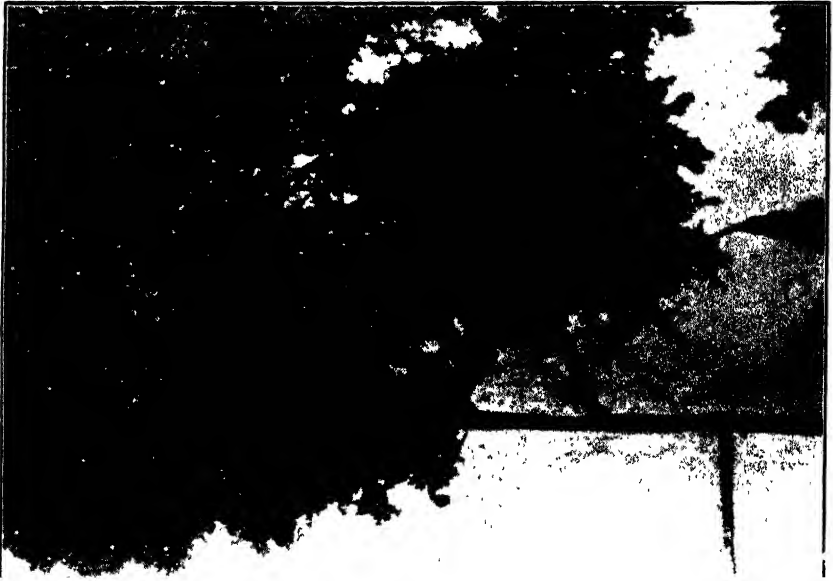
This plant must not be confused with the garden *Torenia*; it is dwarf in



In centre, *Zinnia linearis*. On left, above, the creeping Aster.



In centre, *Hymenatherum*. On right, *Torenia polygonoides*.
On left, *Portulaca pilosa*.



Oldenlandia sp. View from above, showing prostrate habit.



General view of crazy paving by Water-lily tank at Government House, Singapore, showing plants of varying habit.

habit, growing not more than three inches in height. It is, however, very ornamental as its leaves are brown and its mauve flowers, though small, are borne in great profusion. Grown from seeds.

Bonnaya brachiata.

A dwarf plant with small white flowers spotted with red; it is easily recognized by its toothed leaves which resemble small Holly leaves. Propagated by seeds.

Oldenlandia corymbosa.

A small loose growing plant with white, star-like flowers. Grown from seeds.

Oldenlandia dichotoma.

A plant similar to *O. corymbosa*, but with mauve flowers.

Oldenlandia sp.

A prostrate plant, growing not taller than one inch; it forms a dense mass, creeping over the flagstones. Its flowers are white and very conspicuous against the pale green of the leaves. Propagated by cuttings.

Hygrophila saxatilis.

A loose growing plant with bell-shaped mauve flowers. Propagated by seeds.

MISCELLANEOUS HORTICULTURAL NOTES

Seedlings of *Holmskioldia*.

At the Waterfall Gardens, Penang, Mr. Flippance last year obtained several seeds of *Holmskioldia sanguinea*, a straggling shrub with deep orange-red flowers not uncommon in Malayan gardens and usually grown from cuttings. The species is native in the Himalayas, and for some reason (either climatic, or due to the absence of suitable pollinating agents) it does not usually set seeds at all freely here. Mr. Flippance's seedlings have flowered, and three of them are much paler in colour than their parent, the flowers being yellowish-peach with a touch of green. This colour variation is interesting and suggests that further breeding and selection might produce a variety of good colours (yellow to orange) in this species. As *Holmskioldia* flowers very finely on Penang Hill it will be worth further experiment.

Perennial Phlox.

As a result of the success with two varieties of Perennial Phlox in Singapore (see this Magazine Vol. VI, p. 171) a trial has been made at the Botanic Gardens with several other varieties, of which plants were kindly supplied by the Director of the Royal Botanic Gardens, Kew. The plants were sent in a dormant condition, in the cool vegetable store of a ship, and arrived in Singapore on December 19th. They began growth at once, and three of them had produced flowers by the beginning of March, on shoots barely a foot high. The flowers are of quite good size and form, with a slight, pleasant scent. Some of the plants have been propagated by cuttings, which root easily. As pot plants, and also for bedding purposes, the difficulty may be (though it is too early to say certainly) that the plants flower irregularly and do not produce flowers on all their shoots together. They should, however, at least be very useful for cutting, if grown in a nursery where the appearance of the beds is not important. The colours of the flowers which have opened to date are white, rose-pink, and white with pink centre.

The Canton Water Pine.

The Canton Water Pine is a close relative of the Swamp Cypress of the south-eastern United States. It grows beside streams in southern China; there seems to be little recorded information about its habit and natural occurrence. Its botanical name is now usually given as *Glyptostrobus pensilis*, but it is sometimes included in the genus *Taxodium* (to which the American Swamp Cypress belongs). The Canton Water Pine is not hardy in England, and seems to be little known in cultivation in Europe or America. It was interesting, therefore, to find a plant in Singapore, in the collection of one of the local nurserymen.

The plant was in a large oblong pot, which had been made into a miniature garden in the usual way, with rocks etc., part of it being filled with water, in which the Water Pine was growing. Subsequently a plant was obtained from the Canton Botanic Garden, and this is in a pot plunged almost flush with the water surface of one of the small concrete tanks in the Botanic Gardens, Singapore. It has begun to make good growth. The young twigs are pendulous, with narrow leaves up to half an inch long, pale bluish-green. These twigs are deciduous when old in the native country of the plant, but how they will behave in Singapore is unknown. The trees bear cones, about $\frac{3}{4}$ inch long, but it is doubtful whether these will be produced in Singapore, where many exotic conifers remain sterile. The plants tend to be straggly in shape, not compact as many conifers. With care they could be brought into an interesting shape, of the type suitable for small formal gardens. The plants do not need to be actually plunged in water, but they seem to need a constantly wet muddy soil.

Tamarisk Plants.

In this Magazine, Vol. III, p. 132 (July 1933), is a note about the cultivation of a kind of Tamarisk (identified as *Tamarix pentandra*) in Singapore. It is interesting to note that two bushes of this plant, beside the Beach Road Police Station in Singapore, have grown very well, forming quite large shapely bushes, with a fair quantity of blossom. This Tamarisk is evidently well worth growing near the sea, in sandy soil, and may perhaps stand clipping into formal shapes. The foliage is very fine, and the effect is very much that of a very small-leaved conifer.

Summer Cypress or Belvidere (Kochia).

Within the last year or two *Kochia* plants have become common in the Chinese nurseries in Singapore. As usual, it is impossible to find out where the original plant came from. These *Kochias* make very shapely formal pot plants, and last in good condition for a few months, their bright fresh green giving them a lighter appearance than the conifers which are generally used for this purpose. The plants produce seeds freely. Seedlings are treated exactly like ordinary annuals in pots, and reach a useful decorative size in about six weeks. They continue to grow for perhaps another six weeks and after a month or so at their full size (18 inches to 2 feet) they are over. The *Kochias* now usually grown in Europe change colour to a bright red in the autumn, but the foliage of the Singapore plants does not show this change.

A history of the garden *Kochias* is given in the *Botanical Magazine*, 1919. *Kochia scoparia*, a wild species of the family *Chenopodiaceae* (to which belong the beetroot and spinach) extends from temperate Asia westwards through central and south-western Russia to Hungary. The name *scoparia* (from the Latin word

meaning a broom) was given on account of the use of the dry plants as brooms in southern Europe. A narrow-leaved form of the species, probably the same as that now grown in Singapore, was first recorded in cultivation about the middle of the 18th century, when seeds were imported from Holland to Scotland, under the name *Belvidere*, by which the wild *Kochia* had long been known in Italy. This narrow-leaved form did not change colour to red in the autumn; it had disappeared from general cultivation by the end of the 19th century. In 1898 a farmer from Alleghany, Pennsylvania, took seeds from a wild *Kochia* plant growing in the woods of that neighbourhood; this plant had the character of turning red in the autumn. The seeds were taken up by the horticultural firms of Burpee, and were first offered for sale in 1900. Since that time the red *Kochia* has become common in gardens in temperate regions. The *Botanical Magazine* article states: "the change in colour from bright green to magenta red takes place somewhat suddenly in autumn. The change appears to mark a stage in ripening, and to be unconnected with the climatic conditions encountered by the plant whether in this country (Britain) or in North America." If this is true, the colour change should occur also in Malaya, and indicates that the locally cultivated plant is the old non-changing form. This is confirmed by the fact that Mrs. H. A. Byron of Tuanan Estate, B. N. Borneo, reports that she has a *Kochia* which turns red. Further trials should be made from imported seed of the red *Belvidere*.

R. E. H.

Beaumontia.

A few months ago I discovered a plant in my garden, lying on the ground, hidden by a collection of small palms. I had an opportunity of seeing the *Beaumontia* in Mr. John Hands' garden (described in the January issue of this Magazine) and realized that my decrepit plant was a *Beaumontia*. By a Heath-Robinson arrangement of wires stretching from the garage to a convenient coconut palm I managed to hoist the plant aloft, with the result that it has made quite astonishing growth and now flowers freely, forming quite an attractive archway effect on the wires along which it creeps. From its flowers it appears to be *B. multiflora*.

H. L. B.

Gladioli.

My experiences in growing Gladioli may be of interest to readers of the *M.A.H.A. Magazine*.

The *Gladiolus* bulbs were sent out from England in an air-tight tin, packed with dry peat, and, but for very few exceptions arrived here, in North Borneo, in excellent condition.

They were planted out in June on land which had had a heavy flood on it in 1934; this flood had left behind almost a foot of sandy, alluvial soil, on the surface of the original soil. The particular plot of land had both the morning and afternoon sun on it. There was a 75 per cent. germination, but it was very noticeable that the growth of the plants was irregular—this was probably due to some of the bulbs being inferior to others. The best plants were in bloom after about two months, and reached a height of 2½ ft., having as many as ten blooms each, the colours varying from bright crimson, salmon pink, orange, yellow to white.

About two months after the plants had died off, they were dug-up and as many as three young bulbs were found attached to the original bulb. These were dried out in the wind, particular care being taken that the hot sun did not get at them. In November, last year, the new bulbs were planted out in the same beds as previously. The results were even better this time and a 100 per cent. germination was obtained. Some of the plants grew to a height of over 3 ft. and had as many as thirteen and fourteen blooms—larger blooms than were produced from the original bulb. Early this month, the dead plants were dug up and again several new bulbs were found to be attached to the old one, but this time they were small in comparison with the second lot.

V. S.

Garden Design.

In *Vogue House and Garden Book*, a supplement to *Vogue*, dated the 17th February, 1937, there appeared an extremely interesting short article on designing a half-acre garden, admirably illustrated with photographs and a pictorial plan of the actual garden discussed.

The area available was only 180 ft. by 100 ft., and the particular point of the design as a whole was the way in which, by the division of the garden into a number of miniature gardens, each completely separated by hedges, and by the careful arrangement of view-points, an impression of seclusion and spaciousness had been created. The house was only 40 ft. from the road, and other houses were in close proximity.

Skilful use was made of ornamental stone figures, a fountain, bird-bath and garden seats etc. The following extracts are taken from the article in question:—

“To obtain seclusion plant along your boundaries to hide the garage next door. Plant out the front street. Try to keep open any attractive views of the neighbours’ lawns and trees, unless by so doing your own privacy is destroyed. If so, shut out the views.

Next determine one or two (or perhaps three) vistas, running the direction of your longest dimensions. By vista, or axis, is meant an open view, often straight and sometimes very narrow. These vistas should lead to your choicest views (as determined above), and should begin from important doors or windows

or perhaps from the outdoor sitting-room. It is better not to plan a vista with a tree in the centre; it should pass the trees by.

Then determine one or two cross-axes, at right angles to the main vistas. Choose places where the greatest distance can be obtained. This will give your garden a feeling of breadth"

"The area between house and street is devoted to a woods garden, originally an ugly front lawn without privacy.

The terrace with marble fountain at the side of the house is sheltered from adjoining property by more high fencing covered with climbers. An old spruce and horse-chestnut give shade and seclusion. The terrace, paved with flag-stone and bricks, is the outdoor living-room throughout the summer months. A moss-covered wall separates it from the woods garden. There are three jets of running water on this small terrace, the fountain on the axis, a dipping-bowl for watering-pots, a bird-bath against the wall. The continuous sound of water helps one to forget the noise of traffic, which, though invisible, is all too near.

A small breakfast terrace with table and marble bird-bath adjoins the living-room at the back, and a gate through a high fence (concealing the drying-yard) connects the terrace with the summer kitchen, making meals accessible and easy to serve. The axis from the living room French door passes across this terrace. Sentinel lions, three pairs of them, guard the axis. They are placed at regular intervals to form a sequence for the eye to follow. This arrangement has the same effect on the observer as a spaced planting of trees. A diminutive lawn with stepping-stones leads to an enclosed flower garden. A pool, raised up and suggesting a well, with stone figure-head spurting water, is the central figure of the garden, and two old cryptomerias are silhouetted against the western sky.

The next section (to right) is a miniature orchard. A millstone table with carved basket decoration marks the centre of the orchard.

Each of these areas is hidden from the outside world, and each is lived in as if it were a room of the house itself."

While this type of design may not be entirely applicable to Malaya where we cannot afford to shut in our houses, it tempts one to make experiments, and I am trying the effect of a small hedge of Hibiscus across one corner of the garden. There will be a gap in the centre—with possibly an archway or some form of decoration—to allow of a view beyond, in an endeavour to create the illusion of distance, and the hedge will have the advantage of hiding a rather untidy corner.

Natural archways can often be made with existing Bougainvillea by training a new long branch to a neighbouring tree or palm, and later weaving other new shoots round it. I have recently developed quite a successful arch in this manner which now gives two attractive view points of the garden beyond.

H. L. B.

A Note on the Flowering of *Amaryllis*. (*Hippeastrum*).

On January 4th, 1937, Mr. E. D. Butler received six bulbs of *Amaryllis* from the Corona Nurseries, Fraser's Hill. One bulb was kept in dry sand until February 13th, when it was planted out in the ordinary way. This bulb flowered on March 2nd.

The remaining five bulbs were sent to the Singapore Cold Storage Co. and stored in their cool room from January 16th to February 20th. They were then potted in 10-inch pots and flowered 22 to 24 days later.

Five of the six bulbs bore two spikes of four or five flowers each, and the sixth carried one spike only. The flowering period was about 16 days for a bulb with two flower spikes.

The flowers of these *Amaryllis* were particularly fine, measuring $7\frac{1}{2}$ inches in diameter and being of a brilliant vermillion colour with a cream-coloured throat shading to apple-green.

Flowering of Several Unusual Plants.

It is interesting to record that Mr. A. H. Millard has had considerable success in growing horticultural varieties of *Scabiosa* in Kuala Lumpur. He also obtained small flowering spikes of a white *Spiraea* (*Astilbe*). A pink variety planted at the same time failed to flower. He has also grown fairly large plants of the Mexican Tulip Poppy (*Hunnemannia fumariæfolia*) which have occasional terminal flowers. The plant can hardly be called a success from the point of its flowers here, but the glaucous finely divided foliage makes the plant an attractive one for potting.

B. A. L.

Poultry.

HATCHING UNDER A BROODY HEN*

The process by which the embryo or fertilized germ of an egg develops into a young bird is called hatching or incubation. There is no essential difference between these two terms; but the former is popularly employed to imply the natural method in which a broody hen is allowed to sit on the eggs, while the latter word is used more for artificial methods involving the use of machines or other devices called incubators. The smallest incubators on the market have a capacity of about 25 eggs. The natural method of hatching is therefore advisable where fewer eggs than this are available at any one time or where hatching operations are carried out so seldom that the purchase of an incubator would be unjustified.

In the case of chickens, the time required for the young to emerge from the egg is about 21 days from the commencement of hatching. This period, however, may be slightly less in Malaya where, owing to the comparatively high atmospheric temperature, the embryo may have begun to develop during previous storage†. Pullet eggs, moreover, tend to hatch out rather sooner than hen eggs. Delayed hatching is usually a sign of bodily weakness but may also occur if the atmosphere is more humid than usual.

In general, heavy breeds shew a greater tendency to broodiness than light breeds and on this account are usually more reliable as foster-mothers so long as they are not so heavy as to introduce a risk of breaking the eggs. Broodiness is essentially an inherited character, however, and can be bred either out of or into a given strain. Thus, a good laying strain of Rhode Island Reds or Light Sussex will exhibit little if any broodiness, whereas the *kampong* hen generally experiences a number of broody periods during its lifetime. The condition is indicated by cessation of laying, a marked tendency to sit indefinitely in the nest or in a hollowed-out place in some other quiet and shady spot, a lowering of the wings, and a peculiar clucking noise which can readily be distinguished with experience from that of a normal hen‡.

Preparing for Hatching.

To be of practical use, the hen should remain broody for at least 21 days, but it is not uncommon for a hen to lose its broodiness before then. In view of this uncertainty, it is advisable to test a hen's *bona fides* before actually using her. She should therefore be dusted with an insect powder such as sodium

* Poultry Leaflet No. 2, Department of Agriculture, S.S. & F.M.S., December, 1936.

† The lowest temperature at which the chick embryo can begin to develop is 68°F.

‡ It may also be of interest to note that, contrary to popular belief, the body temperature of a broody hen is sub-normal, but that it may rise towards the end of a hatch or if eggs are broken—the rise possibly indicating excitement. Thus, temperatures taken *per rectum* with some fowls at Serdang range from 104.2°F to 107.0°F in the case of broodies as compared with 106.0°F to 107.2°F. in the case of non-broodies.

fluoride§ (particularly under the wings, around the vent and among the small body feathers) and placed for a few days on some unwanted or dummy eggs in an ordinary nest in a quiet place. If still sitting on the afternoon of the third day, she should again be treated with insect powder and then transferred to a sitting-box about 15 inches cube, the bottom of which is made of half-inch wire netting so fastened that the centre just touches the underlying ground when supporting the hen. The box should be placed either on the bare soil or on a large sod of turf in a quiet shady place protected from rain, where the hen cannot be disturbed by other animals. The box should be thoroughly cleaned before use, if necessary with disinfectant (in which case the operation should be carried out a day or two in advance so that the smell has time to disappear). Clean nesting material such as dried grass should be spread on the floor and should be lightly sprinkled with insect powder. The hen and dummy eggs should be introduced in the evening and left alone for 24 hours. If the hen is still sitting then, she should be removed for 15 minutes and given some grain and water. Meanwhile, the eggs for hatching are substituted for the dummies and the hen is then put back with as little disturbance as possible.

The number of eggs which a hen can satisfactorily cover obviously depends on the size of the hen and of the eggs. A heavy breed can usually cover twelve 2 oz. eggs, but a *kampong* hen can usually completely cover not more than eight or nine eggs of this size. The hen turns the eggs at frequent intervals during the hatching period, as is shewn by the fact that they become polished all over and the feathers on the under side of the bird's body become worn. If even one egg too many is used, the whole batch may therefore become chilled in succession and may fail to hatch out.

Eggs for hatching should be selected beforehand. To be fertile, they must be collected from a laying flock which includes an active male bird. They should be of good size and shape, free from cracks and from dirt. If soiled eggs must be used, they should not be washed clean but should be scraped gently with a knife. They should not be stored before use for more than ten and preferably seven days in this climate, during which period they should be kept in a cool place either on their side or with the blunt end upwards. In the former case, it is customary to turn them once a day, but the necessity for this cannot be regarded as proved.

Procedure During the Hatching Period.

Once the eggs have been set, the broody hen should be disturbed only twice a day. Then, at a definite hour in the morning and again in the late afternoon, she should be removed from the sitting box and placed in a run where she can perform her natural functions and get plenty of food, grit, water and exercise. A dust-bath may be added with advantage. Food should consist of greenstuff and grain only, the latter being either whole padi or a mixture of padi and kibbled (*i.e.* broken) maize. The time spent off the nest should not exceed

§ If sodium fluoride is employed, care should be taken not to get the dust into the eyes, nose or cracks in the hand where it may cause irritation.

15 minutes each period during the first week, but this may then be gradually extended to half an hour if the weather is fine. If the hen does not return to the nest of her own accord, she should be captured without fuss and put back. If she refuses to settle down, indicating a cessation of broodiness, a reserve broody may be substituted, if available, or the hatch must be abandoned.

When lifting the hen off the nest, the wings should first be raised in order to release any eggs which may be held between them and the body. One hand should then be placed over the back to hold the wings down, the other hand is slid under the body with one or two fingers between the thighs, and the bird is then removed gently but firmly.

During dry weather, the ground immediately surrounding the sitting-box should be kept slightly damp, especially during the final week or ten days*. The eggs themselves, however, should not be wetted. If possible, they should be candled on the 7th and 14th days, when first infertile and then addled eggs should be removed. A suitable candling apparatus can readily be constructed from an electric torch and a piece of cardboard in which an egg-shaped aperture has been cut. The eggs are held one by one against the aperture, with the lamp behind. On looking through the egg towards the lamp, an infertile egg is seen to be clear, with the boundary of the yolk faintly visible, whereas in a fertile egg the developing embryo can be recognised on the 7th day by the presence of a dark spot with a number of radiating blood vessels—not unlike a spider in appearance. As development continues, a progressively larger portion of the egg becomes dark when viewed against the lamp, the dark mass shewing definite signs of movement if it is alive. In an addled egg, examined on the 14th day, this dark portion is smaller and is motionless. Infertile eggs removed on the 7th day are fit for home consumption if eaten within a few days, or they may be hoiled and fed to fowls.

After 18 full days on the eggs, the hen should be left entirely alone, not being removed even for food. The front of the nest should be closed with a wire screen if she shows signs of restlessness. The eggs usually begin to chip on the 19th or 20th day, after which hatching should be completed in 24 hours. Chicks which cannot emerge by themselves should on no account be helped out of the shell; it is obviously bad practice to encourage hereditary weakness.

As soon as the down feathers are dry, which should occur within a few hours of completion of the hatch, the baby chicks should be placed in a box or basket covered with a cloth to keep them warm and free from draughts, and the hen should be allowed food, water and exercise for 15 minutes. She should then be transferred to a rearing-coop and the chicks placed carefully beneath her. The sitting-box should be cleaned out and put away, empty shells should be buried or burnt, and any eggs which have failed to hatch out should be candled

The object is to keep the atmosphere sufficiently humid to prevent too rapid evaporation of the egg contents. If evaporation is too rapid, the membranes which underlie the shell tend to become dry and impervious, the interchange of gaseous oxygen and carbon dioxide is retarded, and in extreme cases the developing chick dies in shell through suffocation.

or broken open to ascertain the cause of failure. Information gained in this way may prove useful on subsequent occasions. One may be satisfied if ten eggs out of every twelve set prove to be fertile and if, of these ten, eight chicks hatch out without aid.

Subsequent Management.

The rearing-coop should consist of a wooden box, 2 to 3 feet long, 2 feet wide, 2 feet high in front and 18 inches high at the back. A coop of this size is large enough to accommodate 8 to 12 young chicks with the mother hen. The roof should be rainproof. The front should consist of vertical wooden rods or slats placed some 3 to 6 inches apart, the middle slats capable of being raised to form a pophole. In this way, the young chicks may leave the coop at any time during the day whereas the hen is allowed out only twice a day for half an hour during the first week in order to get exercise, food and water. These should preferably be provided in a separate place out of sight of the young chicks. The coop may either be floorless, resting direct on the ground, or a wooden floor may be fitted if preferred. Clean litter should be provided and should be changed every two or three days. The front of the coop should be closed with sacking or *attap* at night and during heavy rain; this will permit fresh air to enter, but it may be advisable to improve top ventilation by drilling a few half-inch holes in the sides of the coop near the roof.

Having placed the hen and chicks in the coop, the pophole should be lowered so that only the chicks can get out. In this country, they soon shew eagerness to move about, but they should not be allowed on to damp ground until they are at least a week old. A wooden plank fitted across the bottom of the front of the coop will serve to confine them during the daytime when necessary.

The old idea that chicks should not be fed during the first 24 to 48 hours after hatching has now been abandoned. It has been learnt by experience that baby chicks which are not provided with food tend to pick up anything they can eat and that this may lead to intestinal disorders. A good chick mash and clean water supply should therefore be provided from the outset. These should be placed in waste-proof and non-foulable vessels outside the coop but within reach of the mother hen during the first two or three days, after which they should be moved further away. A small enclosure of half-inch mesh wire netting should be erected round the coop to prevent the chicks from straying. This enclosure should be covered with sacking if necessary to provide shade during the heat of the day. As a measure of protection against disease, the coop and enclosure should be placed in an area to which adult fowls have not had access for at least a year, and the unit should be moved to clean ground within this area every two or three days. The foster mother should not be allowed to run with the chicks at all during the first week. Subsequently, however, the enclosure should be gradually extended and they should be allowed out together so that the hen may teach the chicks to scratch for worms and insects if they have not already discovered this for themselves. They should not be allowed

outside the enclosure, however, as the tendency is for the hen to wander too far away and so throw a strain on the chicks' strength. During this stage, the hen should still be removed twice a day for food and exercise. After a week or so spent in this way, the hen may indicate by pecking the chicks that she no longer appreciates their company. As soon as this occurs, and in any case after not more than four weeks from hatching, she should be removed altogether and returned to the laying flock.

The young chicks should be accommodated in the rearing coop for 6 to 8 weeks, depending on their vigour and on weather conditions, after which they should be transferred to an area reserved for growing stock, where they should be housed for preference in a slatted-floor night ark, allowing three or four chicks per square foot of floor space at first and gradually reducing the number of birds per house or increasing the accommodation as growth continues. Different batches of young chicks may be grouped together at this stage for convenience in management, provided that they are of approximately the same age and vigour and that care is taken to avoid overcrowding.

Throughout the whole period spent in the coop and growers area, the chicks should be examined frequently and any which are blind, deformed or weak should be removed and destroyed. Apart from the risk of spreading disease, weakly chicks never grow up into profitable birds and it is sheer waste of time and money to persevere with them. Chicks should be active and well-feathered, and should increase rapidly in weight. Heavy breed chicks should average about $5\frac{1}{2}$ to 6 ozs. in weight at 4 weeks and 18 to 20 ozs. at 8 weeks of age; light breeds should reach the same average at 4 weeks and 16 to 18 ozs. at 8 weeks.

Reference.—For information on rations for young chicks, reference should be made to Leaflet No. 1 of this series, "The Feeding of Poultry."

THE LIGHTER SIDE OF POULTRY REARING

Poultry breeding and rearing as a living must be a very precarious one at the best of times, but as a hobby it has its amusing side especially to lovers of animals.

Some of these random incidents during the last three years may possibly be of some help to others.

When one's living does not depend on poultry raising one is apt and permitted to become sentimental over the birds. For instance, we have three fine old cocks who are now pensioned off. Two have a form of bumblefoot, so walking on concrete hurts them and like Agag they walk delicately. They are allowed, therefore, the free run of the garden where the turf is easy to their feet, and as they cannot scratch up the lawn they are eking out a simple existence safely fenced in from their pugnacious offspring. One of these old birds, a Light Sussex has only recently joined them, having lost the sight of an eye in a fight with a younger neighbour. His spurs have to be cut periodically and it is uneconomical to keep him at all or his friends but they are allowed to live. It is needless to say that no suffering bird is kept alive.

The sleeping pens of these old pensioners are under the bungalow verandah and they go to roost every night by themselves. The part of the garden they mostly frequent is known as "Chelsea." Incidentally a pair of wild does has recently taken to visiting Chelsea where they are always sure of a good meal and a drink.

Turkeys are very amusing and interesting birds to keep. The hens, however, with few exceptions lay their eggs away from the house in the jungle or 'belukar' so we find coloured leg rings most useful and time saving in the search for missing hens. Each brood as it grows up keeps together and in the same direction in its wanderings and laying. We are surrounded by coconut estates and secondary jungle, so the turkey hens are marked with a coloured leg ring according to the direction which they frequent. When the hens go to roost at night they are checked up and the missing colour tells us at once in which direction to search for the bird.

Young poults, unlike chicks which quickly fend for themselves after being deserted by their mother, are most lonely and inconsolable and cry for days. One of our old 'pensioners' previously mentioned has regularly adopted these motherless poults and comforted them, with the result that we have had very little trouble with them and they have settled down quickly to new conditions. It is amusing to see them all taking a dust bath together or basking in the sun close up together. Turkeys revel in the hot sun.

Another problem we had to face was when a single poult was left alive out of a brood of several. All goes well until the mother hen abandons it to lay again, for when left without a companion not even the old cock can console it. Now we are in the habit of adding two or three hens' eggs to a clutch of turkeys' eggs a week later (incubation periods being 28 and 21 days respectively),

thus assuring companionship for the poult should all die but one. This friendship rarely lasts after the birds reach maturity but has served its purpose.

Turkeys become very tame and have very amusing habits. When released in the morning, or when otherwise feeling particularly happy they jump about with very realistic dance-like movements. In fact I have watched two or three turkeys for sometime and found they appear to have organised games like those played by children.

I always find turkey hens failures as mothers so always set the eggs under an ordinary hen, these being without exception the best brooders in the yard.

Another delightful bird for the amateur to breed is the Muscovy duck. These creatures also become very tame and several of ours come when called by name. It seems incredible but nevertheless true that although I have over sixty of these ducks my poultry man and I know about forty of them "personally." The shapes of the body vary considerably although to the casual visitor they all look alike except for a difference in the colour of the feathers. One must, however, take an active part in rearing the birds to be able to distinguish them thus.

Our favourite Muscovy duck is the "Admiral" known as "Atmo" to the servants. His hatching out coincided with a visit of the Navy. He is a fine drake weighing nine kati, is quite tame and comes when called. The Admiral was the first and only surviving duckling from my first efforts in the poultry line, so he has always been thoroughly spoilt and, as a result, is very particular about food. His favourite diet, when the cats can be prevailed upon to surrender them, is one of rats or mice which he swallows whole. Also scraps of raw meat when they come his way, as well as fresh fish. The latter must not only be fresh but alive, and this treat is only indulged in when the "ketchil boy" feels inclined to wade into the nearby streams and pools and catch "tiddlers" for him. The fish are then put into the homemade ponds in the yard (large kualis) and the Admiral fishes for them himself.

We all know of the ostrich's propensity for eating nails, and I once had a Muscovy duck who emulated this bird. The duck became lame and was treated for rheumatism but did not respond to treatment. She ate well but gradually became thinner and thinner. Finally we decided to have her killed and a post mortem examination revealed two 1 inch wire nails and a piece of one, firmly embedded in her gizzard; so firmly so that they could not be extracted with the fingers. A hard cornlike growth had developed at the side of the gizzard but the rest of her internal system was in good condition including the liver. It was approximately four months from the time the lameness developed to the time of her death. The nails are still in my possession as a curiosity.

We frequently read of or see performing seals, elephants and other creatures, but there is, I feel sure, great scope in the training and performing of Muscovy ducks although I am not intending to take this up as a sideline. These birds are very intelligent and easily tamed, and we have several that catch pieces of bread in their beaks nine times out of ten.

Then again we have another Muscovy drake named Jack. He is a large

black and white bird. His star turn is to sit on a box and "beg," by throwing his head backwards and forwards in the amusing way these birds have, hissing the while and wagging his tail merrily like a dog. Jack always gets his laugh and a reward !

The Muscovy ducks' supper time is great fun. The last thing in the evening they are given a mash of padi, boiled rice, chopped vegetable and small dried fish, moistened with water. I find the most practical costume for working amongst the poultry consists of shirt, shorts and rubber shoes, and as the ducks are always impatient for their supper, crowding round one and gently nipping one's legs with cold and muddy beaks it is almost impossible not to tread on them. Hence the rubber shoes, which cause little damage or pain.

For the reason that hens are the best brooders of all poultry I find them most satisfactory for mothering sick or ailing chicks, poults, ducklings or goslings. A broody hen can usually be induced to take such weaklings under her care as long as she has an egg left in her nest (hard-boiled or china are advisable), so whenever we are rounding up broody hens to pen them we always leave one or two of them in their nests for a few days at a time against the possibility of requiring their care for the weaklings. Under these conditions whether the young patients live or die, they get the maximum warmth and comfort which nature can provide.

Since commencing this article we have added a little runner duck to our stock, but where he came from is still a mystery. On Chinese New Year's Day our "boy" came along with two tiny ducklings in his hand. They could not have been more than a day or two old. He had found them wandering about in "Chickenville", the part of the grounds where the chicken coops are kept. As we have no runner ducks nor have any of our neighbours we were puzzled. "Chickenville" is separated from the main road by a bamboo fence and a dry ditch, so the only solution of the mystery seems to be that there were ducks and ducklings being carried to market on that day in baskets, and either they fell out into the road or the carriers rested the basket on the ground and the two ducklings escaped through the rather large holes in the poultry baskets used locally. Evidently hearing familiar poultry sounds they went towards them and so came into the grounds through the hedge. They were immediately given to a broody hen but one duckling died the same day. He had been badly bitten by ants. The survivor is flourishing and was at first put with a hen and her chicks who found the duckling's diet of boiled rice and chopped vegetable a change from their own "bras", and *vice versa*. No one has claimed the young fellow yet so we are keeping him.

A week or so after this little duckling joined us we had two goslings hatched out under a hen, and now he is with them where he looks less incongruous and eats the same food.

Poultry breeding and rearing is a pleasant hobby although rather expensive, but in an outstation like ours where there are no clubs of any sort, the money spent each month probably amounts to the same as club subscriptions and other

such expenses. Also if one takes an active part in the work—and one would hardly take it up as a hobby unless that was the intention—poultry breeding provides must interest and entertainment, to say nothing of exercise, all of which more than compensate for the worries and losses which are inevitable.

D. I.

AGRICULTURAL LEAFLETS

It may not be generally known that the Department of Agriculture, S.S. and F.M.S., publishes an excellent series of agricultural leaflets, to which additions are made from time to time, and which are available for free distribution in Malaya.

The following is a list of leaflets published to-date:

No. 1. Tuba Root	No. 9. Pepper
„ 2. Gingelly	„ 10. Coffee
„ 3. Tobacco	„ 11. Gambier
„ 4. Groundnut or Peanut	„ 12. Cloves
„ 5. Bananas	„ 13. Maize
„ 6. Cover Crops	„ 14. Sweet Potato
„ 7. Green Manures	„ 15. Lawn Grasses
„ 8. Fodder Grasses	„ 16. Budgrafting Fruit Trees

A Poultry Series of leaflets has also recently been commenced, No. 2 of which, “Hatching under a Broody Hen” is reprinted in this issue. No. 1 was entitled “The Feeding of Poultry.”

Application for any of the above leaflets should be made to the Department of Agriculture, Kuala Lumpur.

It should be added that certain of these leaflets have been translated and published in Malay, Chinese and Tamil.

Home Section.

THE RELATION OF NUTRITION TO PUBLIC HEALTH *

The importance of nutrition in developing the human body and ensuring freedom from disease has only properly been recognised comparatively recently. Thirty years ago it was generally believed that the dietary requirements of human beings are satisfied so long as they have enough to eat; any illness or physical disabilities from which men not actually hungry might suffer were ascribed to causes other than diet. It is now known that the adequacy of a dietary depends on the presence of a considerable number of factors and that mere quantitative sufficiency may co-exist with a whole series of qualitative defects, any one of which may produce the most serious physical consequences.

Faulty or insufficient diet leads to serious diseases, such as rickets, beri-beri, pellagra, dental caries, certain types of anæmia; further, it appears to pave the way for certain infectious diseases, including tuberculosis. But diet is not only a factor in the prevention and treatment of disease; there is also a close relation between it and physical development and efficiency. In so far as public health activity is concerned not only to defend populations against disease, but also to create a maximum of physical well-being, nutrition is perhaps the most important subject with which it has to deal. In this connection, the public health worker can learn useful lessons from the attitude of the agriculturist and stock-raiser.

Public health authorities to-day are no less concerned with nutrition than with water supply and control of infectious diseases. The protection of the public against dangerously contaminated foodstuffs and fraudulent practices in connection with the sale of food, and the feeding of population groups in schools, prisons, asylums, naval and military establishments, etc., have long been among the recognised duties of the State. During the war, Governments had to feed great armies whose physique and morale had to be maintained at all costs, and at the same time responsibility for providing food for the civilian population had to be assumed. Within recent years, the economic crisis and unemployment have imposed on Governments enormous responsibilities in the sphere of public assistance, of which the most urgent has been the combating of malnutrition. The emergency situations produced by the war and the depression have helped to make clear the importance of public health nutrition work in so-called normal times.

It is useless to ask whether governmental control in this field is legitimate or desirable; it is sufficient to remark that in many countries it exists and is developing. In the field of public health, more and more attention is being given to the problems of nutrition.

* This article has recently been circulated by Government to Departments in the form of a pamphlet, and is reproduced here by permission.

Nutrition is an economic, agricultural, industrial and commercial problem, as well as a problem of physiology.

With the help of schedules of dietary requirements according to age, sex, intensity of work, etc., it is relatively easy to determine the quantity and quality of food required to nourish a given number of persons. But this of course does not take into account digestion and assimilation which are not the same in all human beings. This method can at best produce a standard. The proper study of nutrition goes deeper than this.

All diets which support life in human beings contain protein, fat, carbohydrate, mineral salts and vitamins, but the relative amounts in which these food factors are present vary greatly from one country to another. Broadly speaking, the principal cause of such variation seems to be climate; what we call race has little influence on diet. Climatic and such different geographical conditions as are represented by mountains, plains, inland areas, coastal areas, etc., largely determine the production of foodstuffs. Man adapts his dietary habits to his surroundings and, in the balance which must be struck between physiological demand and environment, the environmental factor weighs heavily. It seems likely that national dietary habits are determined less by choice and instinct than by economic necessity, and, for this reason, it is quite irrational to give them the status of physiological laws. In normal times populations will not readily change their mode of diet, but they will often change it quickly enough under stress of compulsion or economic crisis. The comparative ease with which human beings pass from one regime to another makes it possible to imagine great changes in the distribution and consumption of foods throughout the world taking place without serious opposition.

There is a science of nutrition which is the necessary basis of all practical action. But it cannot be said that fundamental principles in this field are as firmly established as, let us say, the principles which underlie the science of engineering. Many "generally accepted" facts are, in reality, debatable; "laws" which seemed fully established twenty years ago are open to question. In the absence of certainty on many points, it is necessary to make shift with probability.

There are so many variable factors operating in the domain of physiology and psychology that the interpretation of dietary experiments in general is extremely difficult. Laboratory experiments, and particularly experiments on rats, have supplied valuable and necessary information. But in themselves they are often insufficient to clarify the problems of human nutrition, and the need for their conformation by experiments on human beings is becoming more and more obvious. As soon as we leave the laboratory and attempt to study the problems of nutrition in the field, complicated by a variety of economic and social factors, difficulties increase.

There are, however, a number of facts about nutrition which are firmly established on a scientific basis. Such are:

The organism needs to be supplied daily with a certain quantity of food

energy, evaluated in calories. A considerable amount of information exists with regard to calorie requirements. The discovery of food factors—vitamins and mineral salts—which supply no appreciable energy and yet are essential to health has not affected the fundamental problem of energy needs.

The diet must yield protein, fat and carbohydrate. The proportion of these is variable, but only within limits, which are tolerably well established.

Minerals are an indispensable part of the diet, though the quantities necessary are relatively small. From a practical point of view, the most important minerals in human nutrition are phosphorus, calcium, iron and iodine.

There are a number of vitamins which are necessary for growth, health, and even for life itself. Vitamins were once known as accessory food factors; it is now clear that they are very essential food factors.

F. J. MORTEN,
Chairman,
Standing Advisory Committee on Nutrition.

Miscellaneous.

TERMITES

BY

N. C. E. MILLER, F.R.E.S., F.Z.S.,
Acting Government Entomologist.

Of the large number of insects which obtrude themselves on our notice in Malaya, perhaps more frequently than other insects, are the termites or 'white ants', and most dwellers in the tropics have, at some time or other, been at pains to put a stop to their depredations to woodwork in buildings or to cultivated plants. Before dealing more fully with the insects which form the subject of this article, however, it will be appropriate to draw attention to the unfortunate designation which is most commonly applied to them, that is to say 'white ants', for they are neither white nor are they ants, although in a great many respects they offer striking analogies to those insects, inasmuch as their social organization is similar and they are separated into castes. These castes are the workers, soldiers, winged sexual individuals and the royal pair.

Nevertheless, in spite of the fact that, repeatedly, attempts have been made to abolish this terminological inexactitude there is no noticeable desire on the part of the general public to be put right. It therefore appears inevitable that this erroneous designation is not likely, for some long time at least, to be superseded by the correct one.

Termites, of which there are hundreds of species, are widely distributed throughout the tropics and most of the warm temperate regions, for example two species are common in Southern Europe.

In an article of this kind it would probably be out of place to go into details regarding the biology of the various castes, but some indications of the organization of the nests, the division of labour, and the functions of the soldiers, workers, sexual forms and queens is essential.

In point of numbers, the workers take the first place in the community, and it is to them that the work in respect of the care of the eggs and young, which in times of danger they remove to a place of safety, is allotted. They also attend to the cultivation of a special kind of fungus (in certain species) which they propagate in so-called 'fungus gardens', structures somewhat resembling a sponge and composed of vegetable matter and excreta.

These objects are frequently to be seen in this country where the cutting away of banks has been carried out during road widening operations or where small slips have occurred on such banks. It is in such places that the great abundance of termites is brought to one's notice, for generally the surface of the bank will be seen to be pitted with numerous sub-spherical or oval cavities. If the disturbance of the area in which these cavities are present, is recent, 'fungus gardens' will still be seen in some of them, but after exposure to rain they rapidly disintegrate and disappear.

There are always present in these 'fungus gardens' the spores of another fungus, but they are prevented from developing by the worker termites. Should the nest be abandoned, however, they will flourish and will, if the "fungus garden" is situated at only a few inches below soil level, push through and attain their full development above the soil level.

The workers are responsible for the damage to woodwork and to vegetation, and there have been instances in Malaya in which serious inconvenience and worry have been caused by their attacks on a subterranean electric cable, through the lead sheathing of which they had bored, after penetrating the outer wrappings, thus causing an earth fault.

On the other hand, even these destructive insects have their use, for they assist in the destruction of unwanted timber, and it has been suggested that their operations compare with those of earthworms, since, by their underground activities they promote aeration of the soil which they enrich, at the same time, with their excreta. It would, in spite of these undoubtedly beneficial actions, be a thankless task to convince most people that anything could be said in their favour.

The amount of destruction that the workers are able to effect in a relatively short space of time is considerable, but accounts of more than ordinary activity on their part should be received with caution. One account, for example, that recording the complete destruction in the course of a night, of a wooden wagon is set forth in Maeterlinck's 'Life of the Termites'—if the writer is not mistaken.

The soldiers are mainly concerned with the defence of the nest or termitarium, and are readily recognized by their large heads and jaws, the latter in certain species being well developed and occasionally of somewhat bizarre shape. Soldiers of some species are provided with a gland situated on the head and from which they are able to secrete a milky fluid. This has been recorded as very efficacious when used as a defensive weapon against ants, which are among the most formidable terrestrial enemies of termites.

The types of termite nests are many and varied. Of these, the simplest is that constructed in dead timber, namely door posts, window frames, or logs. An examination of such objects which are harbouring termites will reveal an intricate series of galleries having no particular design or arrangement. Termites living in this manner are confined to the object which they have attacked, that is to say, there are no runs connecting the nest to the ground. It is possible for such termites to carry out their work of destruction for a considerable period before their presence is suspected. This occurs when accumulations of minute particles of excrement are observed in the vicinity, or when the timber collapses on pressure being applied to it.

Other kinds of nests comprise those of which the greater part is above ground level in the form of mounds, which are sometimes enormous structures measuring twenty or more feet in height and covering a large area. Very striking examples of these mound nests are to be seen in parts of tropical Africa, Australia and America.

The outer walls, passages and royal chamber, in which the queen is housed,

are much harder than the rest of the structure, and are composed of earth particles bound with saliva.

Many species construct their nests entirely below ground, but, in some of these a small mound of irregular conical shape, or of the shape of a mushroom-like fungus is erected above the site. In all of these nests are a multitude of cells of various sizes interconnected by narrow galleries.

There are some species of termites which construct nests in trees. These nests resemble very closely those built by certain wasps and are sometimes called *étes de nègre*, for fairly apparent reasons.

In a typical colony the community is dominated by the royal pair, which consists of a male and female which have cast their wings. The queen, during the course of her development attains enormous proportions and is fertilized at intervals by the king.

Regarding the queen, there is a popular idea that the nest will die out should she be destroyed, but since there are others held in reserve, and are capable of being brought into a state of reproduction in the event of the destruction of the queen, it is clear that this idea is fallacious. It has been suggested, however, that these so-called reserve queens may reproduce and extend the nest even during the life of the principal queen.

The queens are remarkably prolific, being capable of producing some millions of eggs during their life-time, the duration of which is difficult to estimate, but has been reported by some authorities to be six to nine years.

The winged or sexual forms, particularly in arid regions, when atmospheric conditions are favourable, namely after rain has fallen, leave the nest when they are mature. When the exodus is about to take place, exit holes are prepared, when necessary, by the workers which, with the soldiers, congregate at these exits. The presence of these two castes at flighting time is not clear, but by stretching the imagination one might regard it in the nature of a farewell, the soldiers being the principal participants.

Enormous mortality occurs at flighting times, the winged forms attracting birds in dozens, which it is highly probable consume nearly half of the total number. The survivors which cast their wings shortly after reaching the ground are at the mercy of ants and lizards, so, in spite of the large numbers of winged forms which leave the nest, comparatively few manage to escape and to form new colonies.

It may be believed that the loss of the wings is a disadvantage, but since they have fulfilled their chief function they would actually be an encumbrance.

Shortly after leaving the nest, the sexes segregate into pairs and subsequently mating takes place.

In some districts of Africa the winged forms are collected by the natives and eaten, and, speaking from experience, the writer is able to state that although a good number are required at one time before their flavour is apparent, they are not unpleasant.

Mention has been made of birds, ants and lizards as enemies of termites,

but it must be also mentioned that although these perhaps take the largest toll of the winged forms, there are birds and animals which attack the termites while still in the nest. Birds attacking termites in this way comprise mainly species of the pheasant family which scratch the soil away from the nests and devour the inmates. The principal mammals are the ant-eaters of South America, ant-bears and pangolins of Africa and even carnivorous animals such as the *Proteles* or aard wolf, also an inhabitant of Africa.

In preparing this outline of the life of termites the writer has endeavoured to compress, in the space appropriate to an article of this kind, as many facts as possible, and he hopes that he has succeeded in bringing to notice some facts, at least, which are not commonly known.

SYDNEY LAKE, KUALA LUMPUR

BY

J. N. MILSUM, F.L.S.,

Acting Agriculturist.

It is perhaps not generally known that Sydney Lake, which once was such an adornment to the Public Gardens in Kuala Lumpur, will be considerably improved during the present year. Owing to gradual silting the lake has become very shallow, making it unsightly, and dangerous as a breeding place for mosquitoes. At one time it seemed that the lake might disappear altogether since a proposal was made to fill it in and canalize the intake stream. This project, while perhaps a sound one from a utilitarian standpoint did not find favour with the members of the Gardens Committee who made strenuous efforts to prevent its adoption. Representations were forwarded to the British Resident of Selangor, The Hon'ble Mr. T. S. Adams, asking him to preserve the lake and provide funds for its improvement. This, Mr. Adams agreed to do and the necessary funds were duly entered in the Selangor State Estimates for 1937.

The proposals include the filling of certain parts of the lake with silt dug out from the central channel and adjoining stretches of water. Its main features will, however, be retained including the small island in the main part of lake, the eponymous name of which has often been the cause of merriment to older residents of Kuala Lumpur.

Perhaps the greatest charm of Sydney Lake is its irregular outline flanked by sloping land on either bank. After dark the reflection of the lights in the water adds to its beauty and forms an attractive scene, especially by moonlight.

Having now briefly touched on the conditions of Sydney Lake at the present time let us hark back to the year 1888 when there was neither lake nor gardens. The history of the construction of Sydney Lake and the Public Gardens is recorded in the Selangor Journal dated September 22nd, 1893. The present writer is indebted to Mr. F. L. Jones, Editor of the *Malay Mail* for providing a copy of this article. Its contents make interesting reading and, as the Selangor Journal is not generally available, the major part of the information recorded is reproduced here.

The decision to establish a public garden in the vicinity of Kuala Lumpur was made by Mr. Swettenham, then Resident of Selangor, early in 1888. The land for this purpose was found surrounding the Sungei Bras Bras, which crossed the old Damansara Road near the 15th mile. The stream drained a valley consisting of a swamp lying at the foot of low wooded hills. At the upper end, open land covered with lalang grass extended to what became known later as "Seven Dials." At that time the whole area west of the present Hospital Road was jungle, inhabited by numerous wild animals including pig, tiger, and sambar deer. The mounted elephant in the Selangor Museum shot by Dr. Lucy on 11th January, 1916, at West's Folly, just outside the Gardens' limits, serves

as a reminder of the wildness of this district in early times.

After some preliminary clearing had been done it became evident that the narrowness of the swamp at the site of the present bund would enable an artificial lake to be constructed without great difficulty. It was decided to form a bund a hundred yards long with an average height of eight feet. Mr. Gordon, a local resident, had the work carried out by his firm without charge for supervision or profit. At the same time work progressed in clearing the bed of the proposed lake; roads and paths were constructed in order to give access to the Gardens.

The work of forming the bund continued and the time approached for closing the central gaps through which the stream flowed, thus transforming the swamp into a lake. Finally the stream was dammed back, and fourteen days later, in February, 1889, the water commenced to flow over the spill-way and an artificial lake some fifteen acres in extent was formed.

The next event recorded is the formal opening of the Gardens to the public. This took place on the 13th May of the same year when the Governor, Sir C. C. Smith, accompanied by Sir Charles Warren, officiated. The act of severing the ribbon which opened the road to traffic was performed by Mrs. Swettenham, who permitted the lake to be named "Sydney Lake" after her. Improvements and extensions to the lake-side and surrounding grounds continued for the next two years, until in 1891, the bund unfortunately burst, resulting in much damage and emptying the lake. This was caused by a heavy fall of rain in the upper part of the Gardens being trapped in a ravine owing to a blocked culvert. Eventually the quantity of water became so great that it overflowed the bank forming a path, which it carried away. The rush of water down the lake overflowed the bund and made a breach through which it emptied itself over the flat country below. This accident caused the Gardens to be very unsightly for sometime, but was eventually remedied. Residents in the Swettenham Road area know well what a large volume of water pours down the ravine adjoining the road during a heavy rainstorm.

Since the silting up of the lake, aquatic plants have taken complete possession of all shallow areas. These are mainly species of *Chara*, known popularly as stoneworts. This vegetation provides food and cover for numerous kinds of fresh-water fish, of which some nine species are recorded in the Selangor Museum.

It is felt that this brief record will be of interest to many persons, especially those who live in Kuala Lumpur and hope to see Sydney Lake become again a lake worthy of the gardens that surround it.

PAINTING AS A HOBBY AND AN EDUCATION

BY
A NOVICE.

Nearly twenty years ago, soon after I arrived at school, a plaster cone and various other hideous geometrical models were placed before me and I was told to draw them. As a small child who loved colour, and especially flowers, I revolted at the lumps of plaster, and thought even the cast of Apollo's head deathlike and appalling in its opaque chalkiness. I had no idea how to draw, or even how to start, and my efforts were so incredibly poor that, after a few months, I was told that as long as I lived I should never be able to draw and had better spend my time in some more profitable occupation.

Being fond of pictures, I often wished I could "make" them, though I was quite resigned to the fact that, having no ability, I could do nothing but admire the work of others. Nobody, as far as I remember ever considered letting me play with colours. No, if you could not use a pencil, you were hopeless and had no artistic interest whatever, and there the matter rested until about a year ago.

Nevertheless, inability to make my own pictures did not in any way prevent me from liking them, and as time passed I sometimes wondered if appreciation of them would not be the greater for some idea of how they were made and of what was clever and cunning in the hand of a great artist. I read occasional books and finally decided that it would be quite amusing to dabble with some paints and find out just how difficult the game really was.

Therefore I plucked up courage to enquire how much the materials would cost for a start. I found that a few brushes, a palette knife, a bottle of oil and quite a useful handful of tubes of oil-paints would cost only \$14. I took the plunge and spent a few cents more on some sheets of smooth 3-ply board and then set to work with the aid of a couple of books and the help of an experienced artist.

For the next few weeks I found lumps of paint in my hair, in my nails, on my clothes and even in my mouth. One or two people asked with concern how long I had been coughing blood. Anyhow, some of the paint found its way on to the boards which, having soaked up quantities of the best linseed oil, eventually made excellent fire-kindling.

After a month or two, friends were good enough to say that they could see more or less what I was trying to paint, but beyond that they were non-committal and changed the subject. I borrowed photographs and prints and tried copying them, but that was not very much fun, so I ultimately packed up a car-load of paraphernalia and tried painting out-of-doors.

Somehow, I could not look the part and was shy of being seen posing as a painter. I lack the beard and romantic appearance which is necessary if one is to get away with painting out-of-door where friends may see you. Then, one day I saw a very pleasing pastel-sketch done by Mr. Charton. "Ah, pastels"

I thought; "that will solve the problem." So I bought a few cheap pastels, begged a few more, acquired a few sheets of pastel paper and found that I could transport the lot without being seen. Better still, I could indulge in the secret vice sitting in my car practically unnoticed by the outside world.

For nearly a year now, I have tried to paint and at last I can definitely recognise some of the things I have done. They are amateurish in the extreme, but add a touch of colour to the bungalow walls at a negligible cost. That is about all that can be said for the tangible results.

In addition to this, however, I have found a greatly increased pleasure in the things which meet the eye at every turn. Touches of colour hitherto unnoticed, the myriad shades of green, and the masses of shadow contrasting intensely with the brilliant Malayan sunshine have all come to mean infinitely more. In fact, a short acquaintance with a few paints has, first and foremost, increased the power of observation and of appreciation of common things seen daily.

Secondly, appreciation of pictures painted by others is much greater than formerly, simply through having some idea of how pictures are painted, of complimentary colours and why such colours are superimposed or contrasted, of the labour involved and of why the artist goes beyond and sees more than the camera.

Thirdly, I have discovered a hobby which is a complete relaxation from normal work, and which while entailing absorbing concentration, exercises a little-used part of the mind at least as much as bridge or mah-jong with the added joy of creating something—however indifferent it may be—to show for the trouble.

Selangor Gardening Society.

QUARTERLY NOTES

Supplies of Stable-manure.

Arrangements have been made with the Sanitary Board for supplies of stable-manure to be delivered monthly to members of the Society for \$1 per lorry load. If any members wish to place orders, will they kindly communicate with the Hon. Secretary.

Improved Flower-pots.

Orders were taken for the making of a good type of flower-pot in several sizes. These were completed in January. A few still remain, and may be purchased by members on application to the Hon. Secretary.

Bulbs from Holland.

At the end of last year an order was placed with a firm of nurserymen in Holland for the supply of *Gladiolus*, *Dahlias*, *Achimenes*, *Cannas* and other planting material; this arrived at the beginning of April and has been distributed. It is hoped that a similar importation may be made early next year, as considerable saving in costs is effected by ordering in bulk and obtaining a large shipment.

Plant Breeding.

On February 8th, Mr. Lowe gave a short talk on plant breeding. Having mentioned a few technical points, he described the process of cross-pollination and suggested a number of local horticultural subjects on which breeding might usefully be undertaken.

Jungle Walk.

About a score of members turned up for the jungle walk in the Kauching Forest Reserve on March 6th. A number of interesting plants were noted including flowering plants of *Rhododendron longiflorum* and a striking species of *Sterculea*.

Flower Show.

The Flower Show of the Society is to be held at the Race Course, Kuala Lumpur, on Saturday, April 24th. It is hoped that as many members as possible will exhibit and attend.

B. A. L.

Singapore Gardening Society.

QUARTERLY NOTES

Membership. At the end of March the active membership of the Society numbered 116, an increase of 26 since November last.

Financial Position. A Balance Sheet submitted by the Hon. Treasurer at the end of February showed that the Society was in a sound financial position, the excess of income over expenditure being \$117.10.

Meetings. Meetings during the quarter were most interesting. In January, Mr. L. A. Logan Richardson, Superintendent of the Johore Gardens, gave an address on "Mixed Borders." In February, the Society held its first social meeting at the Adelphi Hotel. The table decoration competition held in conjunction with this meeting was very keenly contested, twenty-nine entries being made. Mrs. H. R. Arbenz received the award in the "No Restriction as to Origin of Flowers" class with a beautiful display of orchids. In the "Flowers grown in the Exhibitor's Own Garden" class, Mrs. P. H. Battishill and Mrs. L. W. Geddes were equally first with displays of Zinnia and small-berried capsicums respectively. At the conclusion of the meeting Lady Thomas gave away the prizes.

The March meeting was held, by the kind invitation of His Excellency Sir Shenton and Lady Thomas, at Government House. Mr. W. Birtwistle, head of the Fisheries Department, S.S. and F.M.S., addressed the Society on the subject of "Fishes and Their Care in Water Gardens."

J. C. N.

THE M.A.H.A. MAGAZINE

JULY, 1937.

EDITORIAL

Fourteenth Malayan Exhibition.

By the time this issue is published the annual Malayan Exhibition will be approaching its final stages of preparation for the official opening by H.E. The High Commissioner on Saturday, the 31st July.

It was disappointing to learn from the speech of the President (Datoh F. W. Douglas) at the recent Annual General Meeting that the Trade Section is receiving poor support this year. With monotonous regularity, year by year, we have reiterated our conviction that this Section is of particular value to business houses in providing them with a shop-window. During the bad years that are passed, those firms which appreciated this fact reaped the benefit of their decision to exhibit, a decision often reached after the expression of considerable doubt on the score of the expense involved. With the improvement in trade conditions there appears to be developing the view that advertising is no longer necessary, and with that view we disagree. Good salesmanship obviously benefits from the increased spending power of the public, and the Malayan Exhibition provides the ideal opportunity for the practising of good salesmanship.

Turning to the agricultural side of the Exhibition, a considerable improvement in the lay-out should be evident with the provision of a new permanent building for the Agricultural Section, permitting of a much more satisfactory display of exhibits. This Section is now more directly under the control of the Department of Agriculture, and extensive revision of the schedule has been made. Competitive classes have been reduced in number from 205 to 126, and exclude classes not truly representative of small holding agriculture, concentrating on products which are of economic value to Malaya. The copra and oils and fats sections, comprising twenty classes, have been re-absorbed into the Agricultural Section, making a total schedule of 146 classes.

Arrangements have been made for the earlier reception of all agricultural exhibits, and judging will take place one, and in some cases two, days before the opening of the Exhibition. One of the principal objects of this change in procedure is to permit of the staging of the best exhibits only instead of the conglomeration of all exhibits received displayed in past years. Although the total number of exhibits will obviously be considerably reduced we feel quite certain that this is a move in the right direction and that the Section will gain enormously in value.

The All-Malayan Padi and Small-Holders' Rubber Competitions will be held again as in recent years. The exhibits displayed at the Malayan Exhibition are the prize winners of a large number of Mukim and District Shows held earlier in the year. The two competitions have proved the soundness of the principle of pre-judging at local Shows, and it is possible that the method will be extended, if possible, to include other non-perishable agricultural exhibits.

The building which in the past has housed the exhibits of the Department of Agriculture and the Rubber Research Institute of Malaya has been demolished, and in its place a prominent site has been allotted at the far end of the main building, immediately in front of the new building for the Agricultural Section.

Composting. We reprint in this issue a leaflet on composting recently published by the Department of Agriculture, S.S. and F.M.S. This article should be welcomed by all keen gardeners as it gives directions for the inexpensive maintenance, by simple methods, of supplies of compost which will ensure continued soil fertility. The leaflet forms a valuable addition to local horticultural literature, and we are indebted to the Adviser on Agriculture for permission to reprint it.

Horticulture.

THE BUNGOR OR QUEEN'S FLOWER (*Lagerstroemia flos-reginae*) AND ALLIED SPECIES IN MALAYA

BY

R. E. HOLTUM, M.A., F.L.S.,
Director of Gardens, S.S.

This is considered by many people to be the most beautiful of local flowering trees. It has lately become better known in Singapore owing to the success of young trees planted beside Thomson Road and elsewhere, which have roused a good deal of interest. Some account of the species therefore seems appropriate at the present time.

The name *Lagerstroemia* was given by Linnaeus in 1769, in honour of a Swedish gentleman named Lagerström, who had considerable interests in eastern trade and instructed his agents to collect botanical specimens. These were handed over to Linnaeus, who was at that time preparing his classical works on the classification of plants, which form the basis of our present system. The species of *Lagerstroemia* which Linnaeus first saw was not the Bungor tree, but a shrub called *Lagerstroemia indica* (the Indian Lilac or Crape Myrtle), which is further described below. The name *flos-reginae* or Queen's flower, well deserved by this beautiful tree, was given by Retzius in 1789.

The genus *Lagerstroemia* consists of about 25 species, mostly trees. The centre of its distribution appears to be Burma, and its whole range from India and southern China through the Malayan region to Australia. There are three native species in Malaya, one being the Bungor itself; the other two are briefly mentioned below. In addition, a species from Siam, recently introduced, has proved successful in cultivation. The Crape Myrtle (*L. indica*) is not very successful here.

Lagerstroemia belongs to the family Lythraceae. The most familiar tropical member of the family is the Henna (*Lawsonia alba*), the fragrant flowers of which make it an attractive garden plant. Another genus, *Cuphea*, has recently come to the attention of Malayan gardeners through the pretty bright flowered herbaceous plant mentioned in this magazine, Vol. VI, October, 1936, p. 173. Those readers who know the British flora will remember the Purple Loosestrife (*Lythrum salicaria*) which makes such beautiful patches of purple in the water-meadows. A curious character of all these plants, which adds to their attractiveness, is the crinkled nature of the petals, which is perhaps most conspicuous in the Bungor itself. The general characters of the flower are similar throughout the family, and can be easily seen by examining the large flowers of the Bungor tree.

Description of the Tree.

The Bungor as commonly seen is a bushy tree of moderate size. In Burma it is one of the most important timber trees (according to Troup) and in the lowland forest of Pahang it attains a size of nearly 100 feet. The fact that most planted trees are smaller is probably due in part to their being in the open instead of in forest, and partly to less favourable soil conditions.

The bark of the tree is thin, pale, flaking off in thin pieces. Except in very young trees, the branches are numerous and form a close crown of dense foliage. The leaves are in opposite pairs, shortly stalked, simple, the margins smooth, commonly about 6 inches long and $2\frac{1}{2}$ inches wide, sometimes as much as 9 inches long. There are numerous lateral veins (about 12 pairs), very prominent on the under surface, pale and slightly depressed above; these give the leaf a distinctive character. The flowers are in erect inflorescences, reminding one very much of the Horse-chestnut tree; each inflorescence has lateral branches as well as the central branch. The flowers are delightfully fragrant. They are each about $2\frac{1}{2}$ inches across, usually with six crinkly mauve petals (crape-like in texture) and a mass of very numerous small yellow stamens in the middle. The sepals, which are hidden by the petals, are thick, triangular in shape, usually more or less reddish, united at the base into a cup which contains the stamens and the ovary. The fruit is small and round, when ripe a dry capsule, splitting open and liberating a number of small seeds of irregular shape.

Each flower opens in the early morning, and is at its best, with fresh yellow stamens, all that day; next morning the stamens are more or less withered, and the petals wither on the third day. The flowers open in succession, so that each inflorescence is in a showy condition for a week or more.

The flowers of the tree as usually seen wild are a pretty bright magenta-mauve. In cultivation there is a whole range of tints, in various shades of mauve and pink, from very pale pink to a rich deep rose colour, and from pale to deep mauve. The pink shades particularly are very attractive. It is found that seeds from a pink-flowered tree when planted produce trees having flowers of a variety of shades, so that one cannot get a uniform stock of trees from seed. The question of vegetative propagation therefore arises. It is possible to propagate from very thick woody cuttings, but this is not a rapid method, if the parent trees are few. Small cuttings seem difficult to root, and experiments with them are now in progress.

Planting.

Seedlings are easily raised. It is found that usually a proportion of seeds are not good, so that an excess should be planted. They are best in pans or boxes, and the seedlings can be transplanted to single pots or bamboos as soon as they are large enough. After the early stages, growth is quite rapid. When planting out in the open, the ground should be very thoroughly prepared by deep digging and manuring. If this is done, and the plants well cared for, a seedling one foot high at planting will attain ten feet, with a few side branches, in a year. It is very important, as with all young trees, to watch the growth of the



Lagerstroemia flos-reginae, a small inflorescence.
(drawing by Dr. Herklots).

young plant carefully, and prune back side branches which appear too soon. Some plants seem to tend to branch very early and will produce low bushy trees if not pruned and staked. Care of this kind is particularly necessary if a uniform row of trees is required. The young plants should be tied to strong stakes five or six feet high above ground, and all side branches which appear below this height should be at once pruned off (unless a bushy shape is particularly desired). After the formation of the crown of the tree has begun, growth in height is naturally much slower. A well grown young tree should have a good bushy crown and flower well at about five years from planting; it may flower sooner. The largest planted tree I know is at Government House, Singapore, and is about forty-five feet tall.

Though young *Lagerstroemia* trees respond so remarkably to good treatment, they are very hardy and will grow, though slowly, in less favourable soil conditions. They are in fact extremely long-suffering, but that is no argument for neglecting them.

The only serious pests I have noticed on these trees are leaf-eating beetles, which attack at night and are difficult to control. Fortunately, a vigorous tree is rarely sufficiently badly attacked to be seriously affected by the beetles, but a weakly tree may suffer considerably. Spraying with lead arsenate is probably the best remedy. Tuba acts as a deterrent but its effect is transitory.

Uses of the Bungor Tree.

In considering the uses of the Bungor tree for ornamental planting, we must remember its bushy shape, its deciduous habit, and its flowers. In Singapore, Bungor trees shed their leaves about every ten months, and the trees do not all behave alike. There is also a tendency for the leaf-shedding to begin at the bottom and work up to the top of the tree. After a short bare stage (usually about a fortnight) the new leaves appear. The flowers follow at the end of the new leafy growth, and at this stage the trees are very beautiful. After flowering the leaves become a little untidy, and finally fall, the period of fall being often rather prolonged. There is therefore a fairly considerable period in which the trees are not particularly beautiful. I therefore consider that in a garden the Bungor tree should be rather in the background, to show off its beauty in due season, but not obtrude at other times. For a shade tree or formal decorative tree near the house, it seems to me less suitable than some other kinds. The bushy habit of *Lagerstroemias* makes them good screening trees, and if planted at say twenty feet they would form a close screen in five or six years time. For avenue planting, forty feet distance is about right.

The flowers are very beautiful for house decoration, but are delicate and should be put into water quickly after cutting, or they will wither, and may not recover.

The Malayan Relatives of the Bungor.

Bungor trees are common and conspicuous beside many of the larger rivers of Malaya. There are two other species of the genus *Lagerstroemia* also native in this country. One, *L. ovalifolia*, is not uncommon in the same situations

as the Bungor, but has smaller leaves and smaller flowers, and so is less conspicuous. It may be clearly distinguished by the prominent narrow ridges on the calyx-cup. The other, *L. floribunda*, is only found in Kedah, being there at the southern limit of its natural distribution. It is a characteristic tree of most of the open country in Kedah and Perlis, not so tall as the Bungor, with smaller flowers, pink in colour, on rather larger inflorescences. A shapely tree in full flower is very beautiful. It is certainly well worth more frequent cultivation, but may not flower so well in the south of the Peninsula as in the north. I have no information as to its deciduous habit or flowering season.

Other species of *Lagerstroemia*.

The Crape Myrtle, *L. indica*, is said to be native of China. It is widely cultivated in India, with several colour varieties and double-flowered forms, but rarely seen in Malaya, as it is not well suited to our wet non-seasonal climate. It is a tall shrub, quite unlike the Bungor in habit, with small leaves.

I have seen plants of this species flowering in Penang a few times, and it is probable that, grown in sandy soil in the north of the Peninsula and pruned regularly after flowering, it may be quite successful. I have also seen plants flowering in Malacca, in a small courtyard in front of a Chinese house. I have never seen this species flowering well in Singapore, and grown under ordinary garden conditions in our usual heavy soil it will not flower at all. This is a pity, as it is a very beautiful shrub.

A Siamese species, *L. Loudoni*, has lately been tried in the Botanic Gardens at Penang and Singapore, and has now flowered in both. It has succeeded best at Penang, probably because of the more pronounced dry season, but the position of the Singapore tree is perhaps not ideal and the species may prove quite successful here also. The trees of this species, as grown in Malaya, have a much less bushy habit than the Bungor. They differ also in the fact that the flowers are produced on the bare branches after leaf-fall, and before much new leaf growth has developed. This makes the flowering much more showy. The flowers are about as large as those of the Bungor, mauve, turning almost white before fading, and thus adding variety to the colour effect. Altogether this seems likely to be a useful tree, especially for garden use, and we are hoping to propagate it.

We have had under trial two other species from Burma but neither of them has flowered yet. One has grown quite well, the other poorly. Both are much subject to beetle attack.

ODONTADENIA SPECIOSA

BY

J. N. MILSUM, F.L.S.,

Department of Agriculture, S.S. & F.M.S.

This flowering creeper is one of the most beautiful plants suitable for cultivation in Malayan gardens on the plains. Like so many other tropical American plants it is perfectly at home here, and when once established is a constant source of pleasure and pride. It is, however, uncommon owing to its usual failure to produce seed and the fact that it is somewhat difficult to propagate vegetatively. The object of this note is to record local experience, with the hope that greater attention may be given to the propagation and distribution of this fine plant.

The following is a brief description of *Odontadenia speciosa*. It belongs to the Natural Order Apocynaceae and is readily recognized as such owing to the structure of its flowers and latex-bearing propensity. The plant is a tall shrubby branched climber, with large oblong tapering rather leathery leaves, arranged opposite on the stems. The growing period takes place after flowering which occurs at least twice a year. Intermittent flowering also occurs, and plants in favourable positions bear flowers almost throughout the year. Numerous strong shoots are produced and these grow with extraordinary rapidity, often exceeding three inches in 24 hours. The stems twine round any available support and turn to the left or clock-wise. The bud is pointed, the corolla-lobes overlapping to the right and twisted to the left. The flowers are produced in racemes which are both axillary and terminal, forming large drooping clusters. The individual flowers are about three inches across, funnel-shaped, with five rounded, spreading lobes. The corolla-tube has a round base and is constricted above before widening into the open flower. The colour of the flowers may be described as salmon-yellow or apricot, streaked with red in the throat, at the base of the lobes, and at the foot of the corolla-tube. The flowers are most fragrant, smelling sweetly of cloves; this is especially noticeable in the early morning when the flowers are at their best. The accompanying illustrations will enable the plant to be recognized at sight.

This climber is often referred to as *Dipladenia Harrisii*, which is incorrect since its floral characters are distinct and separate it from the genus *Dipladenia*. The plant was discovered in British Guiana about 100 years ago and named by Benthham in 1840. It flowered in Europe for the first time in Veitch's nurseries in 1854, being introduced from Trinidad and by mistake re-named *Dipladenia Harrisii* after the Governor of Trinidad, Lord Harris.

The difficulty of propagating *Odontadenia speciosa* is not insurmountable. In the past, the method employed in the Kuala Lumpur Gardens was layering mature growths in pots placed below the parent plant. With care, layering is successful, although slow. Recently, encouraging results have been secured by



Odonadenia speciosa. Plant four years old at Serdang.



Odontadenia speciosa.

the use of cuttings taken from young shoots with a heel of older wood adhering. A fair proportion of these will produce roots if potted in sandy soil and kept in a shady place. Better results still are being obtained by the employment of a closed frame. The cuttings should be about one foot in length, formed from young shoots, placed in small pots containing sandy soil, and plunged in a bed of moist coconut fibre in a closed shaded frame. This method is still under investigation in order to determine exactly what type of cutting roots the most readily. Fruits have been collected upon several occasions at the Kuala Lumpur Gardens. When this happens it is an easy matter to increase the stock of this plant from seed. The reason why seed pods are so infrequently produced is obscure and the pollination of *Odontadenia* is a subject worthy of further study. Seedlings suitably treated produce flowers within eighteen months from germination of the seed. Mr. Holtum tells me that fruits have been observed in Singapore. They are of most curious shape, long and slender. One fruit under observation took three months to ripen after it had attained its full size. It contained about fifty seeds which germinated in two months from sowing.

Mrs. Gough, in her book "A Garden Book for Malaya," mentions that this creeper succeeds best in partial shade, such as obtained when growing over a porch facing east. Although *Odontadenia* will grow in full sunlight, there is no doubt that an eastern aspect affording shade from the afternoon sun, is most congenial. The plant illustrated is grown in such a situation at the Central Experiment Station, Serdang, and it is evident that no better place could be found for it. When grown over masonry a trellis-work formed of stout wire is necessary to support the plant. With occasional attention during the growing period, the shoots may readily be trained in horizontal lines. These growths, when mature, form the frame from which the flowering shoots emerge. After flowering, the shoots may be cut back with advantage since this induces fresh growth and consequently a greater profusion of flowers.

When preparing the site for planting, a large hole at least two feet square should be dug and the soil removed. The hole is then filled with good soil mixed with leaf mould and well-rotted cattle manure. This treatment will give the young plant a good start and encourage free-rooting. When new shoots are being formed and growth is active, additional vigour may be obtained by an application of a nitrogenous fertilizer, such as ammonium sulphate. About half a cigarette tin of fertilizer (4 ozs) dissolved in two gallons of water should be applied to the soil, well away from the main stem. The application of fertilizers should not, however, be overdone, otherwise too vigorous growth will be made and less flowers produced.

In addition to its decorative value as a creeper, *Odontadenia* is specially beautiful when the flowers are cut with short stems and grouped in shallow bowls. Not only are they thus charming to look at but their fragrance is most pleasing. The flowers are particularly attractive when the colour scheme is brown or gold or when brass vases or trays occupy the room. The flowers last for two days after cutting.

JAPANESE FERN BALLS AND DESIGNS

It was quite by chance that we heard about these fern balls and fancy designs, and several of our local Japanese friends who have not visited Japan recently had never seen or heard of these plants.

We wrote to Java sometime ago enquiring about living plants and were referred to a nursery in Yokohama to whom we wrote. This firm sent us their catalogue which is most attractively compiled. It was in this catalogue that we saw the ferns advertised.

These fern designs consist of a wire shape covered or padded with straw to form a foundation over which are firmly bound the roots of the fern so that none of the stuffing shows. Where a more definite outline is required as in the case of a junk or aeroplane, laths of wood are used in the construction.

Some of the shapes are bound with string and others with wire, and we noticed that the string-bound models sprouted earlier than the others, but whether this was due to their softer binding or to their position in the sun, or watering, we cannot definitely prove. We found it advisable to rebind the string bound shapes with wire without disturbing the original string, lest the string should rot and the whole shape fall to the ground, as they are intended for hanging. This binding should be done immediately on opening up the parcel before the fern fronds appear, as the delicate fronds would otherwise be broken off.

The fern roots used in the construction of these designs are of *Davallia bullata*, a dainty little fern not growing more than four or five inches long, and the shapes can be shipped only in their dormant state, which period is from January to March in Japan.

The shapes are sent by parcel post carefully packed in dry moss and ours arrived in perfect condition. They vary in price from Y. 1 to Y. 2 each according to shape and size. The suppliers are The Yokohama Nursery Co., Ltd., Yokohama, Japan. The designs consist of plain balls of various sizes, animals, human figures, lanterns, junks, aeroplanes etc. Every figure is finished off to the smallest detail with attractive china doll heads and most delicate porcelain tusks and rubber ears in the case of the elephant.

The suppliers' instructions are to water the plants immediately on opening the parcel, but we found this was insufficient to moisten the dry roots so for the first watering we completely submerged ours in a Shanghai jar of water for about fifteen minutes and then hung them up in the fern house where they are kept except for short periods when required in the house for decorative purposes, that is, a few days at a time.

These fern shapes when opened up look very uninteresting from a horticultural point of view, and we were very sceptical that ferns would ever appear although one or two actually showed small green nodes or buds. After three weeks to a month they were all in full growth and are most dainty and attractive. They make uncommon house or table decoration, especially in the

latter case when a few blooms of the desired colour of flowers are tucked in amongst the ferns, and a fairy lamp bulb suspended inside. The writer has used this form of decoration and it was a change from the usual vase of flowers to match the colour scheme of the table. The lantern and aeroplane particularly lend themselves to this arrangement. In fact there is a wide scope in the use of these designs for ambitious hostesses.

These Japanese "fern balls and designs" as the suppliers call them have proved irresistible to most of our friends who have seen them, and several have written to Japan to book orders for the winter. Some are to be sent to friends in England, and I shall be much interested in the progress of the latter.

Ours are watered every day when we do not get rain, preferably with a fine spray in order to avoid injuring the delicate young fronds. Before the nodes formed actual fronds, we were in the habit of dipping the whole structure into a bucket of water every day during the dry weather, but this is not advisable after the ferns have sprouted.

We opened up our parcels on February 22nd 1937, and the ferns are still alive at this time (May 14th 1937) and still producing young ferns as the dead ones fall off.

A word about these ferns (*Davallia bullata*) will not be out of place here. They are found in their natural state in the marshy districts or shady mountain parts of Hakone, Nikko and other such districts of Japan. In view of their being found in marshy districts the suppliers stress the point of generous watering in the tropics.

New ventures in amateur gardening are not always successful but we can definitely say that this experiment has proved entirely satisfactory in our case, and we are looking forward to importing another consignment of these plants next winter.

D. I.

[*Davallia bullata*, or at least a closely allied species, grows on trees in the mountain forests of Malaya. We have not heard of this local fern being used for horticultural purposes, though the larger lowland *Davallias* are often cultivated.—Ed.]

COMPOSTING

Garden soils in Malaya are generally so infertile that the production of vegetables and flowers is possible only when some kind of fertilizer, usually cattle manure, is available in quantity. Unfortunately the cost of cattle manure and the added difficulty of obtaining adequate supplies are limiting factors; thus most gardens receive insufficient manure and consequently unsatisfactory results are obtained. Further, even when cattle manure is added to the soil in quantity, its disappearance is rapid as a result of factors such as high temperature, sunlight and heavy rainfall, all of which assist decomposition. As a general rule, therefore, flower and vegetable production in the garden is in direct ratio to the amount and frequency of organic matter added to the soil. Numerous experiments in Malaya have shown that the superiority of organic manures over artificials is very great here, much greater, for instance than in a temperate climate. At the Central Experiment Station, Serdang, artificial fertilizers have been proved quite inadequate to restore fertility to an impoverished soil. Immediate response is, however, always obtained from application of cattle manure. This is borne out by experience on small holdings in mining districts, where good crops are raised on soils composed mainly of sand, by means of the addition of copious supplies of pig manure. The use of organic fertilizers *e.g.* bone meal, restores fertility, but they are costly. In some gardens, attempts have been made to provide organic matter by collecting available refuse and allowing it to rot in pits. This method has only proved partially satisfactory and is frequently objectionable as the pits afford breeding places for flies and mosquitoes.

During recent years, investigations have been conducted in India with the object of producing well broken down organic matter from the waste products accumulating on the farm. This system has become known as the Indore process since the details of manufacture were elaborated at the Institute of Plant Industry at Indore. Employing a modification of this process, it has been found possible to utilize garden refuse for the production of organic compost in Malaya. The organic manure so produced has proved an excellent fertilizer and is capable of yielding results equal to, and possibly better than, those from cattle manure. The object of this leaflet is to describe how such compost may be made, in order that horticulturists may maintain the soil in their gardens at an adequate standard of fertility without undue expense.

Method of Composting.

In every garden there is a certain amount of refuse, such as grass and hedge clippings, dead plants from the flower and vegetable beds, fallen leaves, and prunings from shrubs and secondary jungle. This material forms the basis of the compost heap and should be collected periodically and placed to dry in a corner of the garden. The less woody the material the sooner the compost

will be ready for use. It will be noted that a supply of bulky plant residue obtainable from 'lalang' grass and secondary jungle growth is a great advantage, and may be used to supplement the usual refuse from the garden. Such growth is not ordinarily available in town gardens but may usually be obtained on estates and in country districts.

The material to be used in the compost heap should be thoroughly withered in the sun. A cleared piece of land in an open situation is required to build up the heap. Since water is required to maintain the compost heap in a moist condition, the site should be selected as near as possible to the water supply. The dimensions of the heap may vary a little, but a convenient size is 9 ft. by 6 ft. at the base, 8 ft. by 5 ft. at the top and 3 ft. high. Such a heap will absorb about 500 lbs. of dried garden refuse. The heap should not be made too deep, otherwise decomposition may be retarded and the sequence of supply of compost manure is interrupted.

The following ingredients are required to complete the compost heap of the size suggested above. Fresh cattle dung 32 lbs. and fine dry wood ash 1½ lbs. : the former is usually obtainable from local cattle-keepers, and ash may be obtained from the kitchen or may be secured by burning wood or other vegetable matter in the garden. In making a heap, the fresh cattle manure and ash, mixed with water to form a slurry, is added in eight layers to the semi-dried material. Slurry, sufficient for one heap, is formed by mixing 8 lbs. of fresh cattle dung together with 8 ozs. ash in four gallons of water. This slurry is then divided into eight equal parts, each part being applied over successive layers of the material to be composted. In addition a further 3 lbs. of fresh dung and 2 ozs. ash is scattered between each layer of material. Thus each of the eight layers of manurial matter will consist of 1 lb. cattle dung and 1 oz. ash in half a gallon of water forming the slurry, and 3 lbs. of fresh dung and 2 ozs. ash applied direct. Provided the compost material, cattle manure, and ash are all collected in a suitable position, the heap can be completed by one man in four hours. Thus, allowing for time spent in turning the heap, the amount of labour necessary, other than collecting the material, is altogether approximately one labourer's working day. Collecting the fresh material and transporting it to the composting heap is rather laborious and is best performed by the use of large bamboo baskets.

Soon after constructing the compost heap, the internal temperature will commence to rise until at the end of the second day it will reach a point between 135° and 145°F. In the absence of a suitable thermometer, the temperature may be gauged by plunging a stick into the centre of the heap and leaving it there for three minutes. When withdrawn it should be very hot to the touch. The presence of considerable heat within the heap gives an assurance that decomposition is in progress and that conditions are such as to preclude flies from breeding.

At the end of 15 days the heap should be turned and rebuilt. If any part of the heap is found to be dry, water should be added. In another 15 days, the heap is again broken down and the same procedure repeated. Decomposition will now be active and the heap will be found to have shrunken considerably.

The heap is again turned and re-made at two further fifteen-day intervals; water is added on both occasions if the decomposing matter is found to be at all dry. Satisfactory compost may often be obtained with only three turnings, if the material used is soft and rots down quickly. The quantity of water required to damp the reconstructed heaps depends upon rainfall. During dry seasons as much as eight gallons may be necessary, whereas in rainy weather the addition of water is usually not necessary.

The heap should have decomposed sufficiently to be in a fit state for use at the end of two months, but is in a finer state of division at the end of three months. The material is then dark in colour and any twigs and stalks completely broken down into small fragments.

The original 500 lbs. of semi-dry matter which formed the heap will have decreased considerably in volume but will show an increased weight due to added water.

In order to have a continuous supply of compost available, it is necessary to construct fresh heaps at regular intervals. It is important to add the compost to the land as soon as ready, for if it is kept too long, nitrogen will be lost and the fertilizing value of the compost will decrease. When mixing the slurry for use in subsequent heaps, several handfuls of the former heap should be added in order to induce bacterial action early and thus assist decomposition.

So far no particular local difficulties have been encountered in the manufacture of compost. The main factors upon which success appears to depend are maintenance of high temperatures in the heaps and adequate aeration during the process of manufacture. It is possible that some trouble from over-saturation of the heaps may occur during the height of the wet seasons in November—December and April—May, but so far it is uncertain whether an overhead shelter would be an advantage. The quantities of fresh cattle manure and ash added to the heaps at construction, based on practice in India, appear adequate but with further experience may be subject to modification.

Uses of Compost.

Compost that has been properly made is superior in certain respects to local cattle manure. Owing to its having been thoroughly broken down into fine particles, it is speedily incorporated with the soil and is thus more readily available for conversion into food material for plants than cattle manure.

It is difficult at the present juncture to make fair comparisons between compost and cattle manure since analyses show considerable variations in both materials, depending upon whether leaching has occurred in the former case, and the quality of food fed to the cattle in the latter. Compost recently made by the Department of Agriculture from grass clippings and fallen leaves contained nitrogen (N) 1.5 per cent., phosphoric acid (P_2O_5) 0.5 to 0.7 per cent., and potash (K_2O) 0.5 to 0.9 per cent., calculated on a moisture-free basis. Manure purchased from local cattle keepers, judged by chemical composition, is approximately of the same manurial value as compost, though the nitrogen content of the cattle manure is often higher. All fertilizer constituents in properly stored

manure from well-fed cattle are, however, much greater; in some instances the figures may be nearly double those recorded for compost.

The average moisture content for both compost and cattle manure is about 65 per cent. and this fact should be remembered when calculating the amount of fertilizing constituents present in any given quantity of material.

Compost may be used as a fertilizer for incorporating in vegetable and flower beds, or mixed with soil and sand as a potting medium. As a result of a small trial conducted with Indian corn as an indicator crop, compost has been proved to give satisfactory returns when applied to the land at the rate of 10 tons per acre or 5 lbs. per square yard of land. Increased yields were obtained when the application was doubled.

Further trials with flowers and vegetables are necessary, since there are many aspects of composting that require elucidation. At present there is little or no information as to the frequency of application of compost that is necessary to maintain fertility. As a general guide it is suggested that compost prepared as outlined above may be substituted normally for cattle manure with about the same frequency of application.

If a particularly rich medium is desired, artificial fertilizers may be added to the compost shortly before use. Owing to the compost being in a fine state of division it is possible to mix the fertilizers thoroughly and to secure even distribution in the soil.

NEW OR INTERESTING ORNAMENTAL PLANTS

BY

R. E. HOLTUM, M.A., F.L.S.,

Director of Gardens, S.S.

Bauhinia Kockiana.

This very fine climbing Bauhinia was first described nearly one hundred years ago by the Dutch botanist Korthals, who found it on the lower slopes of the Padang Highlands in Sumatra, and named it after Baron de Kock, Lieutenant-Governor of the Netherlands Indies. It was not known to exist in the Malay Peninsula until collected near Gunong Bělumut in Johore in 1923. It has subsequently been found to be quite common in the swampy part of south-east Johore in the neighbourhood of the Sedili River. It has for many years been in cultivation at Kuching, Sarawak, and I had the impression that it was wild there also, but there is no published record of its occurrence in Borneo. In Malaya it is still a rare garden plant.

Unlike most Bauhinias, the leaves of this species are not divided into two parts. They are rather like Cinnamon leaves in appearance, with three main veins running all the way from base to apex. They differ from Cinnamon leaves in not being flat (the surface being convex between the veins) and in the narrowed acute apex. The leaves are unfortunately much subject to attack from beetles, which spoil the appearance of the plant.

The flowers are frequently produced, in quite large bunches. They are at first a light golden yellow, with red stalks to the petals. There are three fertile stamens, and also five others which are reduced to sterile stalks. In the centre is the rudimentary pod with its stigma. The first colour change is for the veins in the petals to become red. The red colour gradually suffuses the whole petals until they are a rich deep scarlet-orange. By the time their colour change is complete the stamens have withered. The flowers do not all open at once so that there are usually flowers of different colours on the same bunch.

The plant is a woody climber, needing a support, which may be of any shape or height to suit the position, but should be large enough, as when well grown the plants are quite large. The plants are raised from seed and are a little slow at first. Therefore a small support is enough at first, and may be added to later. The only plants I have watched in growth have reached about six feet in height, and flowered, in about two years from seed. An old mangosteen tree makes a good support; but the Bauhinia must be planted at the side of the tree, not right beneath it, where there is too much shade.

B. Kockiana has the great advantage over our common local species, *B. bidentata*, that it flowers at a much smaller size, and is therefore a better garden plant. *B. bidentata* only flowers when it has grown very large, and it



Bauhinia Kockiana.

is difficult to find room for it in an ordinary garden; also it does not flower so freely and the individual flowers are smaller.

The great trouble with *B. Kockiana* is the difficulty of propagation. For some reason, fruits are very rarely produced, and we have not yet succeeded in growing cuttings. We are still dependent on the occasional production of a seed pod; but having two more plants of flowering size we hope to obtain more seeds than in the past.

For house decoration, *B. Kockiana* is excellent: it is in fact one of the best of all indigenous plants for this purpose, the varied hues of the individual flowers adding a distinctive character.

Saraca taipingensis.

The *Saracas* are a group of leguminous trees native in the Indo-Malayan region, about eight species being found in the Peninsula. Several of these are very beautiful when in flower, but probably the finest as a garden tree is *Saraca taipingensis*. Its enormous masses of yellow-orange flowers are a sight not to be forgotten, and its young leaves hanging in long drooping purple clusters are equally striking. It is a pity that this local tree is not more often seen in Malayan gardens.

As grown in the Botanic Gardens, Singapore, the trees do not exceed some twenty feet in height. They are irregularly branched, leafy to ground level. The leaves are pinnate, with five to eight pairs of large opposite leaflets, which may attain more than ten inches in length, the whole leaf being often more than two feet. The short stalk of each leaflet is thickened, and also the base of the leaf stalk. New leaves are produced every few months. Each bud produces a group of leaves, which all hang limply downwards until they have completed their full growth in size. They are at this stage pale mauve in colour, and the tree laden with these hanging trusses is a curious sight. After growth in size is complete, the leaves spread out and turn the usual green colour.

The flowers are produced on the old wood, not at the ends of the twigs. Each inflorescence is branched many times, and eventually produces a solid mass of flowers as much as a foot across. The individual flowers are quite small, orange-yellow in colour. There are no petals, the colour being given by the sepals. There are four stamens in each flower. The flowers are thus very different from the usual leguminous type, which has five sepals, five petals and ten stamens. The leguminous character is seen, however, in the fruit, which is a large pod, dark red in colour.

Saraca taipingensis is propagated from seeds, which are produced fairly freely. It grows fairly rapidly in favourable conditions. A plant at the MacRitchie Reservoir in Singapore island grew to a small bushy tree and flowered in four years from planting. Once the flowering stage is reached, the trees usually flower freely about twice a year, and sometimes there are small flowerings at more frequent intervals. The trees grow in nature beside forest streams. They do not grow well when fully exposed, and need some shelter. They do best

when partly protected by the shelter of larger trees. The best tree at the Botanic Gardens has the morning sun but is protected in the afternoon by a large Tembusu. Good soil is essential for good growth of *Saracas*. In poor soil their growth is very slow and it may be many years before they attain flowering size.

Saraca declinata is a larger species, forming a tree up to forty feet or more in height; it has smaller bunches of deeper-coloured flowers and is very showy when in full bloom. It also needs a sheltered position and a rich deep soil for good growth.

The Saw Palmetto. (*Paurotis Wrightii*).

Tufted palms (*i.e.* palms which produce a tuft of stems, not a single one only) are useful for screens and also as individuals where single plants of formal shape and moderate height are required. The sealing-wax palm (*Pinang Rajah*), a native of Malaya, is one of the finest of all of these, owing its beauty in large measure to the bright colour of the leaf-sheaths, a feature rare among palms. The subject of the present note lacks this character of bright colour, but is conspicuous in its unusual and very graceful leaf form. It is still little known in local gardens.

Paurotis Wrightii is native in Florida and Cuba. The name Saw Palmetto is taken from Millspaugh and Britton's work on the Bahama Flora. Palmetto is apparently a general name for fan-palms in that region, chiefly species of the genus *Sabal*. Bailey (who uses the generic name *Serenoa*) says that the Saw Palmetto is regarded as a nuisance by people who have to clear land in Florida, as it forms thickets which are troublesome to eradicate. He also remarks that it will stand a certain amount of frost, and that the leaves are cut and used for decorative purposes on a considerable scale. He reckons two species, but other authors say there is one only. So far as I know, we have only one kind in Singapore, but seeds have been received from three sources and it is possible that older plants may show differences.

Except for the small leaved *Rhapis*, the Saw Palmetto is the only fan-palm of tufted habit that we grow here, the other tufted palms all having the more common "feather" type of leaf. The leaves are exactly the shape of an opened fan, with very regular folds radiating from the stalk. The margin is cut more than half-way to the centre, with a series of very regular fine sharp points, which are perfectly stiff. It is the perfect regularity and formal shape of the leaves that constitute the beauty of the palm. Each leaf is about 2½ feet across, and is therefore small for a palm; but each plant produces many trunks, each with its crown of leaves, and these intermingle in a most graceful manner. The trunks are fairly stout, and are covered with brown fibrous remains of old leaf-sheaths.

Our only mature plant (a very old one) is about twenty feet tall, but in Florida the palms are said to attain thirty feet or more. Probably fifteen to twenty feet is the limit for practical purposes in Malaya. Young plants, after the first seedling stage, grow quite vigorously, and in about two years should



Savoca taipingensis in full flower.



Paurotis Wrightii, in the Botanic Gardens, Singapore.

produce bushes of good size and shape, with several crowns of leaves. It is many years before a plant attains a sufficient size to bear flowers and fruit. The inflorescences are composed of very slender branches, and the fruits are quite small; they have therefore little effect on the general appearance of the plant. The large plant at Singapore produces a fair number of seeds. It is possible to propagate an old plant by division, as can be done also with *Chrysalidocarpus* and other tufted palms.

The Saw Palmetto is most useful as a formal plant for a special site in the garden. It could be used also with good effect for screening, but its rather slow growth in height would take away much of its value for this purpose in most cases. It would be worth trying at our hill stations, as it is evidently native of a rather cooler climate than the lowlands of Malaya.

MISCELLANEOUS HORTICULTURAL NOTES

The "Japanese Canna."

There is a plant often grown in local gardens and called by the name "Japanese Canna." It is in fact neither a Canna nor Japanese, being a member of the banana family and native of South America. Its name is *Heliconia psittacorum*, which certainly looks rather formidable. But *psittacus* only means parrot, and we can call the plant *Parrot-Flower*. The name was given on account of the resemblance of the bracts to the beak of a parrot. The generic name *Heliconia* goes back to the 18th century and applies to a group of chiefly tropical American plants of the banana family. Why Linnaeus chose to associate the abode of the Muses, Mt. Helicon, with this particular group of plants, I do not know. They are mostly large and handsome plants with banana-like leaves, and several are occasionally seen in Malayan gardens.

The Parrot flower is one of the smallest of the banana family, and has leaves much about the size and shape of Canna leaves. The flower stalk is tall and the flowers stand well above the leaves. Each stalk bears at the top a few large orange bracts, and these are the most showy parts of the plant. The flowers are borne in groups in the axils of the bracts, opening one at a time. They also are bright orange, but the petals are narrow and not very showy. The floral structure is a slight modification of the lily type (which consists of three sepals, three petals, six stamens, and ovary of three parts), the sepals and petals being partly joined together, and one stamen reduced to a short sterile structure, hidden by the petals. The floral structure of true Cannas is very greatly modified, and quite different from the *Heliconias*.

The Parrot flower is very easy to cultivate, being treated in the same way as Cannas. It thrives best in rather wet ground, and in dry sites benefits from liberal doses of leaf mould. It flowers continuously, and is very useful for house decoration.

Poisonous Garden Plants.

There are a few common local garden plants which are very poisonous, and a good many others which have a more or less powerful action on the human system if eaten. A knowledge of these plants, especially among those who have the care of children, is very desirable. Adults are unlikely to eat leaves or fruits of unknown plants, but children may sometimes do so.

The most poisonous common garden plants are Oleander, *Gloriosa*, *Thevetia* (the "yellow oleander") and some of the aroids, often grown as pot plants. Aroids are plants of the *Arum* family, and include the well known *Caladiums* and *Anthuriums*; most of them have a powerful irritant action on the mouth and throat. One of the *Dieffenbachias* is called "dumb cane" in the West

Indies, as anyone eating it is deprived of speech for several days. Some aroids are quite good as food when cooked, though dangerous when raw; this is true of most kinds of *keladi*. Fortunately all members of this group of plants have a strong family resemblance, and it is easy to learn to recognize them. They are all to be regarded as suspect.

Oleander and Thevetia contain strong poisons which act on the heart. *Gloriosa* contains the same poison as the Autumn Crocus; it has a powerful action on the alimentary system. Ridley records the death of a Chinese who died from eating the cooked tubers. The common *Datura* is of course very poisonous, but is not usually cultivated in gardens. The beautiful white *Datura* is not dangerous.

Other plants which, though unlikely to cause death, have unpleasant or dangerous effects when eaten are the Frangipanni, Allamanda, Kopsia, Roupellia, Chonemorpha, Acalypha, Excoecaria, Crotons, Jatropha, and the pink Plumbago. Trees of the mango family (such as the *binjai*), sometimes found in old gardens, are also dangerous, as the juice of some of them has a powerful irritant action on the skin. The local trees known as *rengas* are the most dangerous of this group, but are not likely to occur in gardens.

There are a number of other local plants, found wild or in kampongs, but not usually in gardens, which are more or less poisonous. For an account of these, the reader is referred to Dr. J. D. Gimlette's book "Malay Poisons and Charm Cures."

Flowering of Quisqualis.

We are indebted to Mrs. Shorland of Kuantan for information about the flowering of *Quisqualis* (Rangoon creeper), mentioned in the last issue of this magazine. Mrs. Shorland reports that her plant has flowered a little throughout the year, with a heavy flowering beginning this year in February, after the heavy rains of the wet season were over. A plant in Penang flowered heavily in March 1937, and in July is making new growth.

R. E. H.

Crepe Myrtle.

I should be interested to know if any reader possesses a Crêpe Myrtle (*Lagerstroemia indica*) and whether it flowers.

Three years ago I was given a flourishing sucker of this plant which has grown into a large bush, but it has never bloomed, much to our disappointment. The parent tree grew on this coast (East Coast, British North Borneo) and flowered, as did other suckers from the tree, but mine and a neighbour's have not done so. I mention the coast as many plants which grow well on this coast are a failure on the West Coast, and *vice versa*.

I have carried out all suggestions with regard to position in the garden, light, soil, manuring and so on but without effect.

The crêpe myrtle (I only knew it as the "Crinkled" or "flowering" myrtle) is a beautiful plant which grows well in Hongkong where I first saw it, the finest display being as pot plants. The flowers are pink with crinkled petals and grow in a mass. I could not see this plant in the Botanical Gardens, Singapore, when there in 1934, nor could I give the plant its botanical name. There is a white species, but this is more rare.

I sent a specimen of my bush to Dr. G. A. C. Herklots of Hongkong who has kindly identified it for me as *Lagerstroemia indica*, a native of China but not a true myrtle.

D. I.

[See also remarks on this species in Mr. Holttum's article on *Lagerstroemia* in this issue. Any further information from Malayan growers of *Lagerstroemia indica* will be welcome.—Ed.]

Experiments at Kuala Kangsar.

Sweet Pea.—Yates' Early Flowering Sweet Pea flowered about two months after sowing. Planted in a tub three feet deep, no care or special attention given. Flowers had scent but only a few were produced and the plants were never really healthy.

Melons.—Seeds of "Hale's Best" from Messrs. Yates were sown. The plants were grown in ten inch pots and protected from insects by mosquito wiring. The plants were not protected from rain. The first lot fruited in the rainy season, the fruits being small, averaging about ½ lb. each. A second lot was grown in a dry spell, some plants in a raised brick bed and the remainder in tubs. Several fruits weighing over 3 lb. each were produced as well as other small ones. All had an excellent flavour. A third lot have gone under to the present very heavy rain (May) which started when they were just about to set fruit.

Bulbs, etc. from Holland.

Bessera.—Flowered about three months after planting. Flowers bell-shaped freely produced. Colour: red outside, the inside being striped white and red; stamens with bright green pollen, pistil bluish-purple. Leaves rush-like.

Milla.—Flowered about three months after planting. Flowers erect, white waxy, star-shaped. Foliage rush-like.

Achimenes, Mixed Hybrids.—To-date the following have flowered:—

White: Flowers as freely as the common lavender *Achimenes*. Individual flowers are slightly smaller. Has the same trailing habit.

Rosy-purple: Plant dwarf, erect, flowers sparsely produced, smaller than those of the common variety.

Lavender, striped with black lines: Plant erect, good size, flowers small and fairly freely produced.

Achimenes "Lady Littleton."—Growing well; as yet no sign of flowers.

Alstroemeria.—Growing fairly well; no sign of flowers.

Watsonia.—Three bulbs planted. All shot but two died, possibly owing to heavy rain. Remaining one seems healthy; no sign of flowers.

Cyclobrotha.—Three bulbs planted; all rotted.

G. W.

[*Bessera* and *Milla* are Mexican plants of the lily family which seem to have been little tried in Malaya. They are obviously worth further experiment. *Watsonias* do quite well on Penang hill but have failed in Singapore, and it seems that they are unlikely to succeed in the low country.—R.F.H.]

Giant Snails.

A horticultural note appeared recently in the *Straits Times* closing with the query "How does one combat snails?"

As snails are a troublesome pest of most Malayan gardens readers are reminded that an article was reprinted on this subject in the *M.A.H.A. Magazine*, Vol. V, No. 1, 1935, p. 25, together with a review of an article which had appeared in a Dutch publication.

The following paragraphs are taken from these articles:

"Copper sulphate is the chemical specific against snails, and may be used in a variety of ways to protect seedlings or vegetable plants. Shallow ditches filled with sawdust or sifted wood ash which has been immersed in a 10 per cent. solution of copper sulphate will afford temporary protection. Ropes similarly treated may be pegged around vegetable or flower beds. Beds of flowering plants or vegetables may also be protected by enclosing them with $\frac{1}{4}$ inch mesh wire netting about 18 inches high.

Powdered copper sulphate mixed with fire ashes or sawdust and sprinkled around small beds or at about 6 inches from the base of special plants or alternatively a small crystal of this chemical placed near each plant on the surface of the ground will be found effective.

Copper sulphate solution—1 lb. to 10 gallons of water—may also be sprinkled where the snails are numerous."

"Two large centres in Batavia were cleared of snails by collection and by chemical measures. After clearing the growth, the infested area was sprayed with 4 per cent. copper sulphate. Furthermore, hedges and walls in the neighbourhood were white-washed with calcium arsenate. The snails have a real lime-hunger and so can easily be poisoned. These two areas are now totally free of snails.

As calcium arsenate is easily washed away from walls and trees by tropical rains, it is incorporated with lime and cement, of which mixture small lumps are prepared. These lumps are put in heaps in the infested area and if the snails feed on them they die within four days."

H. L. B.

Home Section.

THE COOKING OF MEAT

BY

MORAG LLEWELLYN,

University of London Teacher's Certificate for Domestic Subjects.

From earliest days man's quest for food has played an important and colourful part in the history and development of the world and its peoples. Vivid pictures of feasts, of famines, revolutions and banquets have come down through the ages, revealing the progress which has been made in the means and methods of preparing food. Meat, garnished and heralded, has probably been the outstanding feature in the pageant.

Meat is the muscle of animals, and consists of bundles of fibres or hollow tubes which contain fluid and are bound together by a fine network of connecting tissue, or collagen, which during cooking is changed into gelatine.

In these meshes are numerous cells containing fat. The shorter the fibre the more tender the meat, the length varying with the kind, age and cut of meat. After slaughter the muscle contracts and the meat hardens during what is known as the "rigor mortis" state. In very mature animals or in any part where there is a great deal of muscle activity, the fibre walls are thicker and the connecting tissue is denser, which means tougher meat and consequently a process of cooking is required which will break down the collagen and soften the tissues.

If meat is cut against the grain (or across the fibre) this diminishes the size of the fibres and renders them more accessible to the digestive juices, but obviously it would be useless to buy coarse fibred meat, cut it across the grain in this way and then roast it, as all the meat juices would be exuded. Although to some extent these juices would spread over the surface of the meat and coagulate when exposed to the heat, thus sealing in a certain amount of nutriment, the meat would be hard. Dry heat is only suitable for cooking large pieces of meat, and, therefore, the better quality cuts of short fibres and fine tissues must be used. The best cuts of meat, however, will be tough when cooked unless "rigor mortis" has passed off, hence the importance of never cooking newly killed flesh.

There are three methods of cooking and it is essential to choose the method to suit the meat. If all the flavour and nutriment is to be retained in the meat a dry method of cooking must be employed, *i.e.* by radiant heat, and roasting and grilling are the two examples. Remembering that this is a quick and drying method of cooking short-fibred cuts of meat only must be used.

When the flavour and nutriment are required in a liquid, then total extraction is the aim. Coarser cuts of meat may be used, as the slow method of cooking will soften the muscle fibres and cause them to fall apart, turning the connecting tissue into gelatine. Cold water has a solvent action, thus the reason for using it when making broths. The same action takes place in stewing, although

here only partial extraction is needed as both the meat and liquid are consumed. If coarse meat is boiled quickly it is tough and tasteless, and if overcooked raggy and tasteless. In the same way the effect of extreme or prolonged dry heat causes the protein and gelatine to be partially burned and the fat to decompose, with the result that the meat has a shrivelled appearance and the fibres fall apart owing to this and to the evaporation of the water. The fact that flesh can be preserved by keeping it below a certain temperature is of great importance to meat purveyors, and of manifold importance and advantage to people living in a tropical country. Some years ago in England there was a prejudice against frozen meat by those who could afford fresh, the criticism being that it was tasteless. True, meat which has been in cold storage can be tasteless but there is no necessity for it to be so if the cook knows her job.

Frozen meat bought at Home has passed the thawing process before it is exposed for sale, but that is not so in Malaya. The meat must be free from any ice before heat is applied, otherwise the outside will cook too quickly to allow the heat to penetrate and thaw the inside, and the result will be a tough and tasteless joint. Frozen meat can always be identified by the amount of liquid which drips from it on standing. Meat contains natural moisture which on freezing expands and in doing so ruptures the fibres of the meat; when thawing takes place these fibres cannot retain their normal liquid and so it runs out of the meat which in a sense accounts for the flabbiness of frozen meat.

In the local markets of this country the meat is much too fresh to be cooked and consumed the same day and it should therefore be kept in the refrigerator until the "rigor mortis" state has passed. Two to three days is not too long for fillet steak, chickens, pigeons, oxtail, etc. to be kept. The meat must be washed well and trimmed before it is stored. Any parts which are the least discoloured must be removed, special attention being paid to fat which deteriorates and becomes tainted more readily than lean flesh. Surface moisture must be dried and the meat must be kept in a covered bowl or dish; it is not necessary or advisable to keep it next to or on the freezing unit itself.

Poultry or fresh game should be kept twenty-four hours and are not in the least harmed if kept four days. Immediately after killing, the bird should be wrapped in two or three sheets of newspapers and kept near the freezing unit until required. It will be found that the feathers are easy to remove without the undesirable practice of immersing the bird in hot water, and the internal organs are removed without any unpleasant smell. The birds will be tender and tasty as, during the "hanging period"—after "rigor mortis" has passed and before cooking—acids are developed which help to soften the collagen, and ferments, present in the tissues, digest the protein of the cells rendering the muscles softer and more juicy.

It sometimes happens, owing to unforeseen circumstances, that the above precautions cannot be taken and it is found necessary to "treat" the meat in order to prevent it being tough. Various methods to rectify this state have been suggested from time to time. Some authorities suggest beating, which certainly

breaks some of the fibre walls, thus allowing some of the meat juices to exude and spread over the surface of the meat where during cooking they will coagulate and seal in the nutriments. Others advocate a good coating of vinegar, basing this on the fact that acid dissolves protein and vinegar contains acetic acid, but forgetting that acetic acid is a poison and that most vinegars are synthetic these days and not the comparatively harmless malt distillates of yesterday. Lemon juice is a much better acid to use and it has the same power of softening the tissues. Modern authorities recommend pineapple juice or a slice of pineapple cooked on top of the joint or steak, or merely served hot and eaten with the meat. The use of pineapple to make meat more tender is good; the acid softens the fibres and the enzyme in it has the power of digesting protein, so the meat is partially digested before consumption which is obviously advantageous to the digestive system.

A native method used extensively in the smaller islands of the Archipelago is to roll the meat in papaya leaves for a couple of hours before cooking, or wrap it in leaves and baste over them if cooking by roasting. Sometimes a few papaya seeds are ground up and sprinkled on large pieces of the meat or mixed in stews. Papaya leaves and seeds contain pepsin, an enzyme present in the lining of the stomach for the digestion of certain proteins, and occasionally found in the vegetable world. It has the ability partly to digest the meat, therefore rendering it tender and easy to masticate and to digest. To conclude, a few words may not be amiss about the basting of meat, about which there has been considerable controversy in the scientific world of cookery. Frequent basting is generally advocated in order to keep the meat moist, but often it has the opposite effect. The fat in the tin reaches a higher temperature than the air in the oven and, if the meat is frequently basted with this fat, the outside of the joint becomes hardened; it then shrinks and the moisture of the meat is liberated. A better result is obtained if a coating is formed on the outside of the meat by applying the correct heat of the oven; hot at first and then lowered after fifteen minutes, which is sufficient time for the surface albumen to coagulate and set, until the meat is "done." By this method the juices remain in the meat retaining the flavour and keeping it moist.

Miscellaneous.

INSECTS AND MAN

BY

N. C. E. MILLER, F.R.E.S., F.Z.S.,
Acting Government Entomologist.

Insects, like the poor, are always with us, and, in tropical countries particularly, are more in evidence than elsewhere, a circumstance which, from the point of view of the keen entomologist, is very gratifying. They make their presence felt in many ways, sometimes disagreeably, but it is a fact not commonly realized, that Man, the highest product of evolution (a statement which most probably will be challenged by some readers) is dependant on insects and their products to a considerable extent.

Scientific research workers have devised substitutes for many of the products of insect origin, but up to the present there does not exist, and it is highly probable that there will not be found, a genuine substitute for honey and beeswax, for example, two articles which have been in constant use from time immemorial.

Although insects provide an appreciable number of substances which man has adopted to his use, man also does his part in providing food and occupation for insects, a fact which will be realized without undue strain to the imagination.

Insects which affect mankind or enter the economy of his life are those insects which directly or indirectly damage growing plants, transmit disease both to him and to his domestic animals, those which assist him in agricultural matters, for example in the control of pests, both insect and plant, and in the enrichment of the soil by burying manure and carcasses, by the pollination of plants, and finally those which provide various raw materials of commerce, or (in a minor fashion) amusements.

In the world there are approximately 500,000 named species of insects, and every year new species are being discovered. Among this vast assemblage of organisms, are some which are barely visible to the naked eye, and others which attain the relatively gigantic proportions of a body length of five to six inches or a wing expanse of ten or eleven inches, occasionally slightly more. It is therefore possible to say with accuracy that there are some insects smaller than the largest Protozoa, or primitive forms of animal life, and larger than the smallest mammal or bird. The largest known insect of these times is surpassed considerably in size by some of the fossil insects which have been discovered; for example, there is a record of a dragon-fly which had a wing expanse of over two feet.

In view, therefore, of the vast numbers of insects in the world, it is not at all astonishing that they and man come into contact to a very considerable extent, in fact, to a far greater extent than any other group of animals with the exception of the domesticated ones.

Regarding useful insects, those producing silk must be placed in the first rank of importance, and it is only comparatively recently that the artificial variety has supplanted natural silk to a great extent, since adornment, not clothing, has become more important from the feminine point of view.

Silk is produced by the larvae of certain species of moths; one species, an inhabitant of China is now cultivated in various parts of the world; others which produce the kinds of silk known as tussore and shantung are cultivated in parts of Asia. Of great interest is the fact that the industry has been revived in England, and that the produce of a certain silk farm was used in the manufacture of velvet for the coronation robes of Her Majesty the Queen and of the Royal Duchesses.

Silk is however not entirely used for the manufacture of cloth but for fishing lines. In this case the actual silk glands of the larvae are removed, stretched and dried.

The products obtained from bees need only a passing reference, as they are well known to most people, but, as regards beeswax, it has more uses than one might suppose, being used for the manufacture of polishes for furniture, shoes, carriages and leather articles, as an ingredient of certain varnishes, for sealing and grafting wax, for moulds for dentists, and, perhaps, above all for the manufacture of "foundation" for the comb in beehives.

A substance which is obtained from insects which have been propagated for many hundreds of years, principally in India, is lac. This is the resinous secretion of a small sucking insect which feeds on a variety of trees, and the first descriptive account of it was made by a certain John Huyglen van Linschoten who had been sent by the King of Portugal in 1596 on a scientific mission to the East Indies.

The uses to which lac is put are many, and, to mention only a few, it is chiefly used for the manufacture of gramophone records, varnishes, polishes, sealing wax, and, in India, it is used for making bangles, toys, for lacquer work and for fixing handles to knives.

A by-product of the lac industry is a crimson dye which formerly commanded a good price, but has now been almost entirely superseded by aniline dyes. This dye is obtained from the dried bodies of the insects themselves.

Recent attempts to cultivate the lac insect in Malaya from brood obtained from India have been unsuccessful owing to climatic reasons and to the depredations of parasites.

Closely allied to the lac insect are other insects which, in India and China, produce a white wax which is highly valued for some purposes. It has, however, been largely replaced by paraffin.

Insects possessing real medicinal value are few. Of course, in native medicines, insects, in some form or other are occasionally used, but it would seem that they are of the same class, and would be as effective as the fantastic ingredients in the cauldron of Macbeth's witches, or as the many patent medicines which flood the market to-day.

There is, however one insect which is of actual medicinal value. This is the so-called Spanish fly, a brilliant green species of beetle found chiefly in the Mediterranean region. Its body when crushed possesses a vesicant property.

It may come as a surprise to many to learn that insects are extensively used as food by certain peoples, and, not solely by those, who are, as yet largely ignorant of the blessings of European civilization.

Authentic records as to the time when insects were first eaten by man are lacking, but it is highly probable that the turning to insects as fit subjects for replenishing the larder was in most cases brought about by famine conditions. During such periods of famine, the truth of the saying "the invention of a new dish is more important to humanity than the discovery of a planet" most likely impressed itself very forcibly upon the sufferers.

When it is mentioned that certain insects are used as food, the average person exhibits considerable repugnance. Now this is very odd, for it is quite likely that the same person will devour with avidity and gusto, shrimps, crabs and crayfish which are among the least particular of animals in their choice of food, whereas the edible kinds of insects mostly feed on various parts of living plants, or on dead timber.

There are indeed, insects, although used as food, which feed on carrion and other malodorous substances.

For a few examples only of edible insects favoured by people living not very far from here it will be necessary to refer to a recently published paper on invertebrates for human consumption in Siam.

In this paper, the author mentions, among other insects, the larvae of various large beetles, certain of which are soaked in coconut milk prior to roasting, and a water bug measuring about two inches in length which is considered a great delicacy. By those who like the flavour of strong Gorgonzola cheese, it most probably is. Locusts and grasshoppers are used also by certain people in Siam who either roast or toast them and then eat them like shrimps. Cockroaches are eaten in some districts, but in most other districts they are not considered edible, probably owing to their smell.

Dragon-flies, termites (particularly the queens) and the larvae of moths and bees are also used as food, after being salted and roasted.

Grasshoppers of some species are sought after as delicacies in other countries, namely, in Tanganyika Territory. In that country, mostly in the interior, large swarms of a moderately large, green, longhorned grasshopper appear, usually about the month of November. The natives, at least those among whom the writer has lived on the west side of Victoria Nyanza and in central Tanganyika collect these insects and sell them in the markets. When offered for sale, the grasshoppers are threaded on to long pieces of grass stem. As regards their flavour, they are quite succulent fried in butter, after the head, wings and legs have been removed. Prepared in this way, and then placed on small pieces of bread, after being soaked in vinegar, they form a useful addition to the evening's "small chop."

Another insect which the natives living on the shores of the great African lakes catch for food is a small fly which may be frequently seen in dense swarms, resembling clouds of smoke drifting over the water. The flies are caught by the people by means of a basket, the interior of which is smeared with butter or ghee. The basket is fixed to a pole, and is waved to and fro in the swarm of flies. When sufficient flies are collected they are scraped out and cooked. The flies are also attracted to artificial light, and it frequently happens that it is necessary to sweep up the large heaps of them which have accumulated on the floor of the bungalow. The flavour of the flies is closely akin to that of shrimps.

The famous French naturalist, the late Henri Fabre, in one of the volumes of his *Souvenirs Entomologiques*, describes a small party given at his house to a few friends to whom he offered roasted larvae of a large wood-boring beetle. After some hesitation on the part of his friends, these delicacies were tasted and pronounced not bad, the flavour of the "meat" resembling almonds or vanilla, but the skins of the larvae, however, proved too much for them.

Fabre states "the skin being so leathery left much to be desired, the dish is a delicate sort of sausage, wrapped up in parchment; the contents delicious, but the covering defeats one. I offer the remains to my cat; she refuses them, although she is very fond of sausage skin. My dogs, assiduous attendants at meal times, refuse it obstinately, certainly not on account of its toughness, for their greedy gullets are quite indifferent to the difficulties of swallowing. In the portion offered, they recognised, by their subtle sense of smell, something out of the way, absolutely unknown to their race, and, mistrustful, after one sniff, they retreat, as if I had offered them a piece of bread smeared with mustard."

An insect commonly used as a colouring medium in the preparation of foods, is the sucking insect known as cochineal. This insect is indigenous to Mexico and feeds on prickly pear.

As materials for making ornamental objects, many insects, particularly those from tropical countries, often appeal to popular taste, but perhaps the most common way in which brilliantly coloured insects serve for adornment, is when they are made up into jewellery. For this purpose, the iridescent and metallic coloured wings of butterflies or the complete bodies of beetles, are used. In Brazil, living beetles commonly known as "fireflies" are, on occasion, enclosed in small gauze bags and worn in the hair by women.

A passing reference to a not unimportant aspect of this subject, that is, the parts insects play in providing sport and amusement for man, will not be out of place.

The best known insects of this category, no doubt, are performing fleas, which witness to the marvellous ingenuity and patience of their trainers. In China, fighting contests are arranged between crickets, which are very carefully tended, and sometimes provided with elaborately constructed cages, and with exquisite small porcelain bowls for their food.

As aids to agriculture certain insects are of inestimable benefit particularly from the point of view of their carrying pollen from plant to plant, thus ensuring

the production of fruit or seed. One of the cases in which the agency of insects is essential, is that of the successful cultivation of the Smyrna fig, the superior flavour of which is due to the presence of ripe seeds, in other words to fertilization.

The transference of pollen from a wild fig to the flowers of the Smyrna fig is essential for this fertilization, and is carried out by a small insect of the wasp family.

A SUPPLIERS' REGISTER.

The suggestion has been made, as it has been made before, that a suppliers' register should be included in *The M.A.H.A. Magazine*. Several attempts in the past have been made to maintain such a register, but they have failed through lack of support. We shall, however, be very glad to make a further attempt which we hope will this time be successful.

The suggestion on this occasion has emanated from outside the Peninsula, and it will obviously assist us if readers will indicate the information they desire.

We think it reasonable to stipulate that suppliers who wish to be included in such a register shall become subscribers to the *Magazine*.

Suppliers' Register.

Readers are first referred to the advertisement pages of this issue.

Poultry.

Mrs. B. C. Stanleigh,

Rhode-Island Reds.

153, Ampang Road, Kuala Lumpur.

School of Agriculture, Malaya, Serdang. Rhode-Island Reds. Cockerels only available at present. Pullets are seldom, if ever, available, and no settings of eggs can be supplied probably for three or four months.

Review.

Garden Rubbish and other Country Bumps.

By W. C. Sellar and R. J. Yeatman, authors of "1066 and All That", "And Now All This", and "Horse Nonsense." Published by Methuen & Co., Ltd., London. 131 pages, illustrated.

This book, which was published in 1936, has only now come to the notice of the present reviewer. Its authors are perhaps better known for their historical and other literary researches, but they undoubtedly bring a specialized knowledge and experience—particularly necessary for the distinctive treatment of their subject—to the work of compilation of the present publication.

That the authors have made a success of this text-book there can be no doubt. It will be read by all gardening enthusiasts and professional horticulturists with the greatest of interest, and it is not too much to say that it is almost impossible to estimate accurately the value of this book to horticultural literature.

The general design of the book is unusual and of extreme interest. In place of the more usual sections, "Garden Rubbish" is divided into four "Bumps," but no definition is provided or explanation offered for this nomenclature.

Bump 1 deals with Nature Studies, and is divided into two parts, the first dealing with A Sort of Biography of Dame Nature, and the second, entitled Nature in the Raw, providing A Brief Survey of the Facts of Life.

The second Bump, Garden Rubbish, is curiously divided into ten Spits, this term being described as "a Spade Measure, meaning *as much earth as a Gardener can dig without having to stop and spit on his hands.*" (The italics are those of the authors).

The third Bump, Beyond the Unpleasance, has two sub-sections, I. Bee-keeping Unveiled, and II. The Mental Condition of the Hen.

The last, or fourth, Bump is entitled The Wind-on-the-Heath Bother, and provides A Khaki Study for Campers, Trampers and sundry Empire Savers.

As will be gathered from the above summary of contents the authors cannot perhaps be said to have kept strictly to their subject, and, even in the sections dealing more particularly with gardening, the unusual aspects they offer, at times threaten the serious value of the book as a whole, although with this view other readers may not concur. At the same time it cannot be denied that this unusual point of view, the constant stressing of which in this review cannot be avoided, will probably place a higher value on the publication than if it had been written in the style more usually adopted in horticultural text-books. With this view the present reviewer feels certain that all readers will agree.

In the second Bump there is a valuable section on garden planning, although it is intended primarily for home gardeners and is not capable of complete application to Malayan gardens. Nevertheless it will doubtless provide local enthusiasts with several new ideas worthy of consideration.

The authors are particularly interesting when dealing with Earth Control (Spit the Fifth), and since poor quality of soil is a common failing of Malayan gardens, careful study of the method of soil improvement by the "transmigration of soils" is recommended.

The various successful methods of developing a satisfactory lawn are noteworthy, and No. IV—the static, pedalogical or plantigrade method—will probably appeal most to Malayan gardeners, "because all you have to do is to *stand perfectly still for a very long time, thus allowing the grass to grow under your feet.*" (Authors' italics).

Other points dealt with in this second Bump are Manurial Rites; Some Favourite Pests, Rock Gardening, Crazy Gardening, Manual Labours, Sowing, Weeding, Pruning, Watering, and Mowing and Rolling.

The remaining sections, Bumps three and four, while interesting reading are not concerned with horticultural subjects, as their titles, already quoted above, indicate.

The book is freely illustrated with line drawings, which, although original in style, accord well with the exceptional nature of this text-book, and adequately support the text.

H. L. B.

Where Smugglers Walked.

I have been the fortunate recipient, from a kindly reader, of a copy of the above book (by Ian Davison, published by Herbert Jenkins Ltd.) and I have derived so much pleasure from reading it that I feel that this note, which is not intended as a review, will not be out of place.

The book describes the sudden decision of the author to live in the country, his patient search for a house which would meet his ideals, his discovery of what, at first sight, appeared to be the ideal but beyond restoration within the limits of a modest purse, and finally the success which he achieved.

It is book to read, not to summarize, and the naive, happy and enthusiastic account of the author's experiences, in converting desolation into a miniature paradise will rouse frank envy in the hearts of most Malayan readers.

H. L. B.

The Malayan Agri-Horticultural Association.

Annual General Meeting.

The Annual General Meeting of the Association was held on the 10th June, 1937, at the Association's Office, 8 Barrack Road, Kuala Lumpur. Datoh F. W. Douglas, President of the Association, took the Chair.

Chairman's Report.

Datoh F. W. Douglas said that he felt that the Association was going through a period of change. He did not know whether the Trade Section of the Exhibition was going to be supported to the same extent as in previous years but if not, it would mean drawing in their horns. He had no reason, however, to think that the Association could not carry on without that Section's support. He added that H.E. the High Commissioner (Sir Shenton Thomas) had very kindly consented to open the Exhibition.

In presenting the Balance Sheet and Accounts for the year, Datoh Douglas referred to certain debentures which were originally registered in the name of the Ipoh Branch of the Association now no longer in existence. That Branch, he said, held an exhibition one year and ended with a loss of \$3,000, but at the same time they sent The Malayan Agri-Horticultural Association \$3,000 to take up debentures. These debentures, however, were never issued to the Ipoh Branch although they appeared in the total number issued. They had never actually been issued and the auditors had asked the Association to obtain legal advice with a view to their cancellation. That, of course, would wipe out \$3,000 on the liability side. Receipts from the 1936 Exhibition were \$2,000 less but expenditure was \$1,000 down compared with 1935. This year the Association ought to save at least \$2,000 on temporary buildings. The Association had received a vote from the Government, who had very generously given back grants which they had withheld during the slump, and with that money a further permanent building was being built.

Referring to the Working and Income and Expenditure Accounts, Datoh Douglas said that they would see that, although the Football Association said they would use the Stadium more often, they actually used it less than before and income was down \$1,500 on that account. \$2,000 more for depreciation had been written off than in 1935.

On the proposal of Mr. L. Y. Swee, seconded by Mr. Pat Zilwa, the Annual Accounts and Report for 1936 were passed unanimously and adopted.

Seremban Branch.

The meeting decided to accept the Seremban and Coast District Association as a Branch of the Association on payment of an annual subscription of \$15.

Livestock Section.

The President informed the meeting that on the advice of the Veterinary Department, it was decided not to hold a Livestock Section at this year's Exhibition due to disease among cattle, goats and pigs.

Office Bearers.

The following were elected office bearers for the current year:—

President:— Datoh F. W. Douglas,

Vice Presidents:—The Hon'ble the Adviser on Agriculture, M.S. (Mr. O. T. Faulkner, C.M.G.), (*ex officio*), The Hon'ble The Raja Muda of Perak, Mr. John Hands, M.C.H., The Hon'ble Mr. Lai Tet Loke, The Hon'ble The Raja Uda, Tengku Yacob, Kedah, Tengku Ahmad, Muar, Tengku Stia, Trengganu, Dato Perdana Mentri, Kelantan.

General Committee.

Messrs. L. Y. Swee, T. D. Marsh, E. W. Cooke, R. G. H. Wilshaw, Eu Kee Eng, R. Paton, S. C. Colomb, R. Macgregor, Pat Zilwa, M.C.H., James L. Ross, and Chew Sze Foong.

Stadium Sub-Committee:—Datoh F. W. Douglas, Messrs. James L. Ross and Pat Zilwa, M.C.H.

Auditors.

Messrs. Walter Grenier & Co. were re-elected auditors for 1937.

The meeting congratulated Datoh F. W. Douglas on the honour conferred on him by H.H. the Sultan of Selangor.

REPORT FOR THE YEAR ENDING 31st DECEMBER, 1936.

The following gentlemen served on the General Committee of the Association during the year:—

President:— Datoh F. W. Douglas,
Vice Presidents:— The Hon'ble the Adviser on Agriculture, M.S. *ex officio*, The Hon'ble The Raja Muda of Perak, M.F.C., Mr. John Hands, M.C.H., The Hon'ble The Undang of Rembau, M.F.C., The Hon'ble Mr. Lai Tet Loke, M.F.C., The Hon'ble The Raja Uda, M.F.C., Tengku Yacob, Kedah, Tengku Ahniad, Muar, Tengku Stia, Trengganu, Dato Perdana Menteri, Kelantan.

General Committee:—Messrs. L. Y. Swee, S. C. Colomb, T. D. Marsh, R. Macgregor, E. W. Cooke, H. S. Talalla, F. C. Cooke, Pat Zilwa, M.C.H., Eu Kee Eng, H. L. Barnett, R. G. H. Wilshaw and V. L. Cachemaile.

Membership.

Membership at the close of 1936 was 424 (Life members 101, Ordinary members 323). Affiliated Societies numbered five.

Finance.

Debentures. \$500 worth of debentures were redeemed in 1936.

The profit on the Thirteenth Malayan Exhibition was \$1,359.82 as compared with \$2,272 in 1935.

Thirteenth Malayan Exhibition.

The annual Malayan Exhibition was held as usual at Kuala Lumpur on 1st, 2nd and 3rd August, 1936 and was opened by His Excellency the High Commissioner.

Attendance was 46,194 as compared with 30,036 in 1935; a full report appeared in *The M.A.H.A. Magazine*, October, 1936.

Stadium.

The ground was used for Malaya Cup matches and for certain of the football matches played in the Selangor League Competition and in the Selangor Cup Competition.

The Selangor Badminton Club continued to use throughout the year the courts in the main building in the Exhibition grounds.

All-Malayan Padi Competition.

The first prize went to a Pahang exhibitor. A full report of this appeared in *The M.A.H.A. Magazine*, October, 1936.

District Shows.

In addition to the award of the bronze medals to the local shows held in connection with the All-Malayan Padi Competition, silver and bronze medals, diplomas and certificates were awarded to District Shows held at Teluk Anson, Kuala Trengganu, Kuala Selangor, Bentong, Kuala Langat, Kuang, Sabak Bernam and in Kelantan.

Malayan Christmas Hampers.

The scheme, commenced in 1933, for the despatch to Great Britain of hampers of Malayan produce as Christmas presents was again successfully organised in the year under review. A total of 149 hampers was despatched as compared with 342 in 1935.

The M.A.H.A. Magazine.

The Association's quarterly journal, which was revived in 1933, was published regularly throughout the year.

Acknowledgment.

This opportunity is taken of expressing keen appreciation of the services rendered in connection with the Exhibition by the large number of voluntary workers, Section Secretaries, Judges, Stewards and helpers; by the Y.W.C.A., the Girls Guides' Association and the Boys Scouts' Association; by District Officers, the Agricultural and Co-operative Societies Departments and the Rubber Research Institute of Malaya; by the F.M.S. Railways, the Electrical and Posts & Telegraphs Departments.

Recognition is also made of the very great help given by the Police Department, in connection with the Exhibition.

By Order of the Committee,

H. G. BIRNIE,

Secretary.

KUALA LUMPUR,

1st June, 1937.

Balance Sheet as at 31st December, 1938.

We have examined the above Balance Sheet with the Books and Vouchers of the Malayan Agricultural Association and have received all the information and explanations we have required.

We are of the opinion that the foregoing Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Association's affairs as at 31st December 1934, according to the best of our information and explanations given to us and as shown by the Books of the Association.

11th May, 1937.

WALTER GRENIER & CO.,

Certified Accountants.

Advisors:

Income and Expenditure Account, 1936 Exhibition.

[illegible]

Working and Income and Expenditure Account for the year ending

31st December, 1936.

EXPENDITURE.		INCOME.	
1935	1935	1935	1935
To Stadium Expenses.		By Gross Profit on Exhibition	
\$ 1,229 03 " Upkeep	\$ 1,226 80	" Government Grants	\$ 1,359 83
481 86 " Assessment	440 26	" Subscriptions	5,900 00
		" Affiliation Fees	681 00
1,009 74 " Exhibition Ground Upkeep		" Rentals, Stadium Etc.	35 00
38 85 " Bank Charges	333 67	" Malayans Hampers	1,114 68
922 80 " Printing and Stationery	29 28	" Interest	1,323 86
2,040 00 " Salaries and Office Rent	426 50	" Cookery Book	106 97
900 00 " Audit Fees	2,040 00		11 32
119 50 " District Shows	200 00		
308 17 " Postages etc.	323 70		
377 99 " Magazine	433 28		
171 32 " Miscellaneous	162 46		
72 65 " Cookery Book	\$ 5,615 95		
6,311 91			
6,219 23 " Balance being surplus on working	4,895 69		
\$ 12,481 12	\$ 10,511 64		\$ 10,511 64
To Debenture Interest		By Balance brought down	
\$ 2,867 50 " Depreciation for year	\$ 2,817 50	" Balance being deficit	
3,031 91 " Bad Debts	5,084 34		\$ 4,895 69
319 81 " Balance being excess of Income over	489 43		3,476 86
\$ 6,219 22	\$ 8,371 27		\$ 8,371 27

Singapore Gardening Society.

QUARTERLY NOTES

Meetings.

A discussion on the Singapore Flower Show was the subject of the March meeting. Mr. John Laycock, who has been closely connected with the Show since its inception, gave a paper dealing with its history. In the discussion which followed, some very useful hints were recorded on improvements in staging. It was agreed that more attention should be devoted to cut flowers and that more exhibits should be arranged on the ground so that they might be seen to better advantage.

In May, Mr. J. C. Nauen gave a talk and practical demonstration on the various methods of plant propagation.

In June, the Rev. Nigel Williams gave a paper on "Gardening Geography." Mr. Williams gave several accounts of the varying behaviour of certain plants in different parts of the Peninsula.

All meetings were well attended.

List of Plants Suitable for Cut Flowers.

Members of the Society have been asked to help in compiling a list of the various plants suitable for cut flowers, the information sought being.—

1. The name of the plant.
2. The length of time flowers will remain open and in good condition.
3. Whether the flowers remain open during the evening or not.
4. Whether the foliage can be used.
5. Useful hints in connexion with arrangement etc.
6. Other observations.

Exhibition for Kebuns and House-boys.

The Committee have decided to hold a small show for members' kebuns and house-boys. The table decoration section by house-boys should prove very interesting.

J. C. N.

Owing to pressure of duties upon transfer from Kuala Lumpur, the Hon. Secretary of the Selangor Gardening Society regrets that he has been unable to contribute quarterly notes for this issue. [Ed.].

THE M.A.H.A. MAGAZINE

OCTOBER, 1937.

EDITORIAL

Fourteenth Malayan Exhibition.

We include as usual in this issue a report of the recent Malayan Exhibition held in Kuala Lumpur during the August Bank Holidays. This Exhibition is organized by the Malayan Agri-Horticultural Association, and is the principal object of the work of the Association.

Some adverse criticism was made of this year's Exhibition, and the committee responsible for organization will perhaps gain consolation from the realization that such criticism implies a healthy interest in the Show, and also will benefit from the suggestions put forward—many of which were practical—for the improvement of future Shows.

The Malayan Exhibition is essentially an annual event that must continue to grow and develop, and criticism must be welcomed for its development. Its organization is not a simple matter; it is hard work, and most of it voluntary. It is not always easy to think of the natural channels of improvement, until the Exhibition has become a fact, when they become obvious—and kind critics point them out.

On the other hand, definite advances in organization are sometimes overlooked or not fully appreciated. In our July editorial we drew attention to the changes which were being made in the Agricultural Section, but from the reports published at the time of the Exhibition it seemed probable that the new basis of organization had been imperfectly understood.

From our own personal experience of several successive Shows we would unhesitatingly say that this year's Agricultural Section was the best yet staged.

While it will be seen from the report of the Show that the total number of exhibits accepted for judging in the Agricultural Section was very considerably less than last year, due to the late receipt of the majority of exhibits, it should be clearly understood that this fact did not affect the number of exhibits actually displayed in the Section. Only prize-winning and high-quality agricultural produce was on show, and this careful, selective, staging made the Section a really valuable and instructive one, and a very definite advance on previous years when the acceptance for display of all exhibits, irrespective of quality, nullified the educational value of the Section, but from the point of view of quantity, made it look an overwhelming success to the inexperienced eye.

We were glad to see that, when declaring the Exhibition open, H.E. Sir Shenton Thomas expressed the same views as ourselves in our July editorial on the subject of the Trade Section and the necessity for continued advertising in times of prosperity. We are also grateful to His Excellency for his plea for more members for the Association which we quote in full:—

“ I would at least urge the need for additional members, especially from the estates and firms. The subscription is only \$2 a year. The Association is trying to help Malaya. That it is popular is shown by the numbers who attend its Exhibition. Why not therefore give it practical support by becoming a member ? ”

In stressing this appeal for an increased membership we are aware that we are speaking to the converted, since most of our readers are already members or at least regular subscribers to this journal; to the latter we may perhaps be allowed to suggest that, for 1938, they become members at the slight extra cost of 80 cents.

**Horticultural
Section.**

Mr. R. E. Holttum, who has very kindly been responsible for the horticultural section of *The M.A.H.A. Magazine* since it was revived in 1933, proceeds on leave this month, and Mr. J. N. Milsum, of the Department of Agriculture, S.S. and F.M.S., has been good enough to promise to look after this important part of our journal during Mr. Holttum's absence.

The M.A.H.A. Magazine undoubtedly owes its rapidly growing reputation as a horticultural journal to Mr. Holttum's work, and readers will be glad to learn that articles will still be forthcoming from Mr. Holttum during his absence. We feel sure readers will wish to join with us in wishing Mr. Holttum a very pleasant leave.

INDEX TO THE M.A.H.A. MAGAZINE.

An index to Vols. VI and VII of *The M.A.H.A. Magazine* will be published with the next issue of the Magazine, i.e. January, 1938, and, in future, an annual index will be provided.

The previous index, for Vols. III, IV and V, was issued with Vol. VI, No. 2 (April 1936).

Malayan Agri-Horticultural Association.

FOURTEENTH MALAYAN EXHIBITION

BY

H. L. BARNETT.

The Fourteenth Malayan Exhibition, organized by the Malayan Agri-Horticultural Association, was held in the Association's grounds at Kuala Lumpur during the August Bank Holidays, the 31st July, 1st and 2nd August, 1937. The organizers were again fortunate in having fine weather throughout the three days of the Show. The total paying attendance was 25,966, and 9,412 entered with free passes. The corresponding figures in 1936 were 24,700 and 22,200 respectively. The total number of visitors in 1935 was 30,036, and 22,588 in 1934.

An additional permanent building has now been erected by the Association, and the general lay-out of the Exhibition benefited considerably from the better accommodation available, it being necessary to house only the Horticultural and Poultry Sections in temporary buildings.

The Agricultural Section was transferred to the new permanent building, and the Department of Agriculture and the Rubber Research Institute of Malaya staged their exhibits in the main building instead of in a separate wooden shed as formerly.

The Opening Ceremony.

The Exhibition was honoured by the presence of H.E. Sir Shenton Thomas, High Commissioner for the Malay States, who declared it open on the morning of the 31st July in the presence of a distinguished gathering which included Lady Thomas, H.H. The Sultan of Selangor, the Raja Muda of Selangor, the Raja Bendahara of Selangor, the Raja Muda of Perak, and the Hon'ble the British Resident, Selangor.

Dato F. W. Douglas, President of the Malayan Agri-Horticultural Association, in calling upon His Excellency to open the Exhibition, paid a tribute to Government's generosity in restoring the proportion of the annual grant, cut during the years of the depression, which had permitted the construction of the new permanent building. Dato Douglas drew attention to the important work of the Drainage and Irrigation Department which, he implied, did not receive sufficient publicity, and suggested that large scale models would permit of fuller appreciation of the valuable results achieved.

His Excellency Sir Shenton Thomas spoke as follows:—

"I think it will be admitted that the Fourteenth Malayan Exhibition opens to-day in auspicious circumstances. Two years ago, when I had the privilege of addressing you, I ventured to suggest that the progress of the scheme for rubber regulation gave hope for the future. We can say now that the scheme is a success. Stocks have been reduced to reasonable

proportions and the average price last year was higher than anyone would have dared to predict. It is true that recently the market has been dull, but the fall in price of many other commodities has been as great if not greater, and I see no reason for thinking that the setback is more than temporary. I may say, too, that I can find no real grounds for believing that, given the continuance of the existing quota, Malaya will be under-produced at the end of the year.

Estates are spending much money and thought on improvements, and the replanting of considerable areas is being undertaken. The cost of production is being carefully watched.

Small Holdings.

On the small holdings, the upkeep continues to improve, and the quality of much of the product is now excellent. You will be able to see this for yourselves when you go round the rubber exhibits. Some of the small-holders' exhibits compare very well with good estate rubber, and the work done in supervising and explaining by officers of the Agricultural Department and by the Asiatic Instructors trained by the Institute of Rubber Research is invaluable.

I commend to your notice also the padi exhibits. As you know, the winning samples in the All-Malayan Padi Competition, organized by the Malayan Agri-Horticultural Association working in co-operation with the Department of Agriculture, are entered for competition and the standard attained is high. It may interest you to know that, whereas in 1929-30 the area under padi (both wet and dry) was approximately 657,000 acres and the production 152,500 tons, in 1935-36—the last available figures—the area was approximately 725,000 acres and the yield was 325,500 tons. That is to say, in six years the crop has been more than doubled although the additional acreage planted has been comparatively small. The increase in the crop is due to the gradual change-over from dry padi to wet padi, to more efficient water control, and to the extended use of improved seed. But there is still much to be done. The imports of white rice alone were greater last year than the whole of the local crop.

There has been a real advance in the quality of copra produced by small-holders and by those who cure the nuts which they buy from small-holders. This is very largely due to the work of the Agricultural Department which was mentioned last year. The new type of kiln has, on the whole, been most satisfactory, but experiments are still being made to improve it. On the other hand, the scheme for grading under the Mark system has had to be dropped. The trade in copra in the world's markets is, so I am told, peculiar in that there is almost a complete absence of machinery for fixing the price ultimately received by the seller in any exact accord with the quality of his produce. But, because the Mark Scheme is not feasible, it does not follow that there is no need for improving the marketing of copra and no possibility of doing so; and the Government will investigate other methods.

Pineapples.

Pineapples are another product in which the Mark Scheme system has made but slow progress. The packers and exporters have agreed on all the major points, but much delay has occurred in settling details. This is unfortunate, because some scheme for the reliable grading of

Malayan pineapples is essential. The English market for the cheap tin, which has hitherto been able to absorb most of the Malayan trade, appears now to be reaching saturation point, and other markets will have to be sought. And, I would add, other markets in countries possessing a more certain climate than we suffer at home, because I read the other day that owing to the cold summer of last year the demand for tinned pineapples in England fell off considerably. Now, in seeking new markets it is essential that the quality of the article offered for sale should be exactly what it is stated to be. A cheap article need not be of high quality, but it must be of reliable quality. If, therefore, the Government should fail in its efforts to obtain the full co-operation of the packers in a voluntary grading scheme (and I sincerely hope we shall not fail), then we shall have to consider the introduction of a compulsory grading scheme.

New Crops.

Then as to new crops. It has always been the declared policy of the Malayan Governments to try and lessen the agricultural dependence of this country on rubber. The policy is not only a form of insurance, but to-day—in the conditions imposed by rubber restriction—it is also one of developing the land. There is still much good land in Malaya which might well be opened up.

There are several crops of which it might be possible to say that they might prove profitable to estates, but there are only two of which it is possible to say that the Agricultural Department has tried them out on an estate and has been able to prove that they are profitable for estates. These two crops are oil palms and tea.

In regard to the former, some two or three years ago, in the worst of the slump, the Vegetable Oils Committee advised against any extension of oil palm planting. Whether that recommendation had been made or not, no one would have considered the opening up of new estates during the slump, but the Adviser on Agriculture informs me that to-day he sees no reason why the area under oil palms should not be increased. His Department considers the industry a profitable one and that it is at least as sound an investment as any non-restricted crop. Mr. Faulkner adds that, even at the worst time of the slump, estates were carrying on at no very serious loss, and there are few heavily capitalized industries of which this can be said.

Tea and Restriction

Tea is subject to restriction, and it has been suggested that by joining in the scheme of restriction the industry in Malaya has been held back. I think that any slowing down of development was due, not to participation in the scheme, but to the fact that negotiations took an unduly long time and that while they were taking place it was not possible to alienate fresh land for tea planting. When you are negotiating on such a matter, and the basis of calculation is the area of land alienated on a certain date, it is obviously not possible to include land alienated subsequently. In point of fact, all the land which may be alienated in Malaya for tea cultivation during the present agreement, which expires on March 31st next year, has not yet been alienated: but, nevertheless, in any negotiations for a continuance of the agreement we shall press for a much larger area so that this promising industry may not be seriously harmed.

Peasant Crops.

Turning now to peasant crops, we seem to have relied too much in the past on rice and rubber. But the Agricultural Department is of opinion that there is a number of other crops which peasants and small-holders can grow with profit to themselves, and in future more attention will be given to the economics of such crops. I hope that the various Administrations will assist the Department in this. Malaya is most fortunate in that its agricultural production is not wholly in the hands of estates, nor wholly in the hands of the peasant. It is the simultaneous development of both kinds of agriculture that makes for the good of a country.

Cameron Highlands.

A few words about the Cameron Highlands. The Adviser on Agriculture thinks that various citrus fruits, such as grape fruit, oranges and lemons, show promise of being successful. The tree tomato grows profusely, so does the dwarf banana. There is of course a big demand for fresh vegetables and high-class flowers. The Agricultural Department proposes, therefore, to rent some 10 acres in the Renglet area which, together with the Tanah Rata Experiment Station, will enable the cultivation and marketing of possible crops to be undertaken more thoroughly than in the past. Meanwhile, I would invite your attention to the exhibit of Highlands produce which is as good and as comprehensive as usual. And perhaps I may add here that the amenities of the Highlands are being steadily improved, partly by the successful introduction of trout into the streams—we hope that before very long fishing will be possible—and partly by the construction of a first-class golf links. Now that we are better off, I hope that the development of the Highlands will be more rapid.

The Trade Section.

There are many other exhibits on which I should like to speak. The Horticultural Section is nearly twice as large as last year, thanks largely to the interest of those who grow flowers for sale. The Arts and Crafts Section is excellent as usual, and is of the utmost value to the people. For example, Trengganu exported silk sarongs and cloth to the value of \$300,000 in 1936, and white brass to the value of \$60,000. This is more than double the export of 1934. The Trade Section is as large as last year notwithstanding the absence of many European firms. I venture to think this abstention is regrettable. A trade exhibit at a Show such as this is nothing less than advertising, and it seems to me that it is precisely in good times that energetic and up-to-date advertising—always important—is of special importance, because it is in good times that new markets are created which will help us through bad times. But, if in asking for more exhibits I am thought to be asking too much, I would at least urge the need for additional members, especially from the estates and firms. The subscription is only \$2 a year.

The Association is trying to help Malaya. That it is popular is shown by the numbers who attend its Exhibition. Why not therefore give it practical support by becoming a member?

Malaya at Glasgow.

The Malayan Governments themselves have recognized the need for advertising, and we have just arranged to take space at the Empire

Exhibition which is to be held near Glasgow next year. The space reserved will, I believe, be adequate for our needs, and I will say frankly that I want the Malayan section to stand out as the best of all. This is a fine country and we ought to put up a fine show. But there is yet another and a stronger reason. The Exhibition has the interest of the King and it is the first of its kind since His Majesty succeeded to the Throne and a Scottish lady became our Queen. On all counts, therefore, the cause is good.

I am glad to say that the Adviser on Agriculture has kindly consented to be the Chairman of the Committee which has been set up locally to arrange for our exhibits. The time at his disposal is very short—barely six months—and the Committee must therefore be very small so that it can work quickly. Mr. Faulkner and his colleagues have been given practically a free hand, and he asks for the hearty co-operation of all. I am sure he will not ask in vain.

In promoting this Annual Show the Malayan Agri-Horticultural Association is doing most valuable work. It has been proved that, without some central exhibition, local shows tend to die away, and it is largely due to the efforts of the Association that local shows are to-day more numerous and better organized than ever before. On your behalf therefore I offer our sincere thanks to all those who have worked so hard, and have given freely of their time, to make this Exhibition a success.

I have much pleasure in declaring the Exhibition open.

The Exhibition was divided into three main groups: Competitive Sections, Government departmental exhibits, and the Trade Section.

Competitive Sections.

All-Malayan Padi Competition.

The All-Malayan Padi Competition was held for the fourth successive year. The general standard of padi was high; the quality of the fifteen exhibits selected for final judging was higher, it was considered, than in any of the three previous years.

District and State Shows were held at numerous centres during the two or three months preceding the Exhibition as shown in the following table:—

	Local Padi Competitions	District Shows	State Shows
Penang	.. —	1	—
Province Wellesley	.. 3	—	—
Perak	.. 15	3	1
Selangor	.. 1	4	—
Pahang	.. 32	6	—
Negri Sembilan	.. 34	3	—
Malacca	.. 1	2	—
Kelantan	.. —	—	1

The number of exhibits received from each of these States for the Central Competition was as follows:—Penang and Province Wellesley 12 (12), Perak 43 (42), Selangor 17 (16), Pahang 14 (17), Negri Sembilan 12 (14), Malacca 11

(11), and Kelantan 3 (2), total 112. Kedah, unfortunately, was unable to send exhibits this year (22). The figures in brackets are for 1936 (total 139).

The first process in judging the 112 exhibits was the elimination of those that did not reach a sufficiently high standard of purity and cleanness. This reduced the numbers by half. A few more exhibits were discarded on account of notably under-ripe or unevenly ripened grain.

Types of grain were then considered. Approved types included those of wide popularity for yields and quality of rice, and those with grain of good size, well filled.

The last fifteen selected for the final stage in judging included four samples of Seraup type, four of Siam, four of Radin varieties, two varieties of Nachin and one exhibit of Mayang Sabatil. It is of interest to note that ten of these (2 Seraups, 3 Siams, 4 Radins, 1 Nachin) were Department of Agriculture selected strains.

The prizes were awarded as follows:—first prize for a very even and well matured sample of good-sized Seraup type from Labu Ulu, Negri Sembilan; second prize for a very evenly matured sample of Siam 29 from Kuala Pilah, Negri Sembilan; third prize for an exhibit of Seraup 36 from Parit Buntar, Krian. There was considerable difficulty in fixing the final order of these first three prize winners. Fourth prize went to another exhibit of Siam 29, from Kandang, Malacca, which was not quite so evenly ripe as the second-prize winner. Fifth prize was awarded for a sample of Radin Kuning 2 from Raub, Pahang. This was a very good sample but was not considered as good a type as either the Seraups or Siams. The sixth prize went to Rembau, Negri Sembilan, for a fully ripe unselected Siam, with grains somewhat uneven in size.

Five other exhibits require mention. A small-grained Seraup type from Perak was of excellent appearance, but was not better than the two prize-winning Seraups and was considered not quite as good in type. This applies also to two exhibits of Radin Merah (R. 4 and R. 7). Two Mayang Sabatil and Nachin exhibits contained a proportion of imperfectly filled grain, though otherwise of a high standard of quality.

All-Malayan Small Holders' Rubber Competition.

This is the third year that this competition has been held. Organization follows the lines of the Padi Competition, prize-winning exhibits from District Shows being re-judged at the Central Competition held in conjunction with the Exhibition.

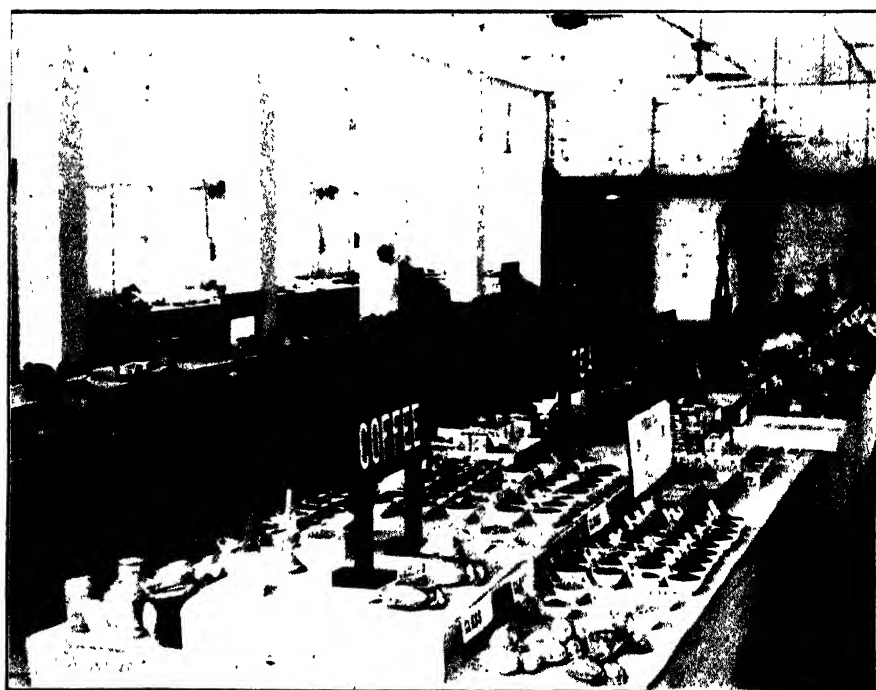
Entries were again restricted to smoked sheet only, and each entry consisted of three sheets. A total of 104 entries was received, as follows: Perak 25 (22), Selangor 17 (17), Negri Sembilan 12 (11), Pahang 14 (13), Malacca 7 (6), Province Wellesley and Penang 10 (8), Johore 19 (20). The figures in brackets are the 1936 entries totalling 97.

The judges, officers of the Rubber Research Institute of Malaya, report that the entries were of an even higher standard than last year, and judging was extremely difficult because almost all the entries were of first class quality.

THE ALL-MALAYAN PADI COMPETITION AND EXHIBITS OF THE
DEPARTMENT OF AGRICULTURE.



VIEWS OF THE COMPETITIVE AGRICULTURAL SECTION.



The first prize was awarded to a Chinese at Sabai, Bentong, Pahang, who won the first prize in 1936. The second prize was won by a Malay at Parit, Perak, and the third prize by a Malay at Jementah, Johore. The entry of another Chinese of Sabai, Bentong, was very highly commended.

Agriculture Section.

As mentioned earlier in this report the Agriculture Section was housed in a new permanent building which permitted a very much more attractive and satisfactory display than in former years.

Important changes had been made in the organization of the Section, the most revolutionary being the decision to stage only prize-winning and specially selected first quality exhibits. This change resulted in a much smaller display but enabled the selected exhibits to be adequately displayed, and made the Section more of a true "exhibition" of agricultural produce, and less of a "collection" as in previous years.

The total number of exhibits accepted by the stewards for judging was 2,186 as compared with 5,397 in 1936.

The reduction of classes in the schedule from 225 to 146 was probably partly responsible for this decline in entries, but the chief reason was the arrival too late for acceptance for judging of a large number of exhibits which had, therefore, to be excluded.

The general standard of quality was higher than in recent years, and once again an outstanding exhibit was the display of produce by the Cameron Highlands Society.

Other Competitive Sections.

The Horticultural Section was an outstanding success, and a particularly attractive innovation was the display of miniature gardens constructed by the various exhibitors in front of the building housing the Section.

The two new permanent buildings which were added in 1936 were employed to house the Preserves and Confectionery, Art and Photography, and Needlework Sections, and the Village Industries and Schools Sections. With the former Sections were included State stalls of Selangor, Kelantan and Trengganu.

It was again unfortunately impossible to hold a Livestock Section owing to the prevalence of disease locally, but a very excellent display of poultry and other birds was to be seen in the Poultry Section. The standard of exhibits in this section was very high. As usual there was a large number of entries in the classes for Rhode Island Red and Rhode Island Red \times local fowls. The gold medal for the best bird in the Show was awarded to a Rhode Island Red cock owned by Che Ahmad bin Hj. Hassan of Sg. Arra, Penang, and exhibited in the small-holders' class. This exhibitor is to be congratulated on achieving the distinction of being the first small-holder to win the gold medal. The prize-winning bird was the progeny of a bird obtained from the Department of Agriculture, thus showing the results of the work of the Department in this direction.

There was a marked improvement in the standard of birds in the small-holders' classes, in which a satisfactory number of Rhode Island Red x local fowls were exhibited.

A Leghorn hen was awarded the silver medal for the second best bird in the Show. Although Leghorns are apparently dying out due to failure in the past, the birds exhibited by the prizewinning owner were in excellent condition, which appears to indicate that if these birds are correctly bred they should do well in Malaya.

Other birds exhibited were Orpingtons and Barred Rocks.

For the first time a pair of Aylesbury geese and a pair of black swans were exhibited and aroused much interest.

There were large entries in the pigeon classes as usual, and the standard of exhibits was very high. Particular mention must be made of the Racing Homer class. The Royal Air Force, Singapore, exhibited their Racing Homers for the first time, and won the silver cup awarded for the best Racing Homer, and the silver cup for the best bird in the Show. There was keen competition in this class and the R.A.F. are to be congratulated on their successes.

The Cat Section was held as usual on the third day of the Exhibition but entries, although some reached a high standard, were disappointingly few.

Department of Agriculture, S.S. and F.M.S.

The Department of Agriculture staged an exhibit demonstrating work in progress on padi, pineapple canning, and derris (tuba root).

The stand, which included the All-Malayan Padi Competition, Copra, and Oils and Fats competitive classes, was situated in the main building in front of the new permanent structure allotted to the Agricultural Section. The general arrangement of the exhibits was a great improvement over that of past years.

The Rubber Research Institute and Rubber Competition exhibits were situated nearby, and thus all agricultural exhibits for the first time were grouped together.

The padi exhibit consisted of a collection of well-proved selected strains of different varieties from the Experiment Stations at Titi Serong, Krian; Pulau Gadong, Malacca; and Telok Chengai, Kedah. Additional popular varieties were also shown from these districts and from Kelantan, Pahang and Penang on which the Agricultural Department has recently begun selection work.

In the centre of the stand was a diagrammatic representation of the process of cross-pollination, together with a sample of a selected strain of hybrid padi produced by cross-fertilization of high quality Siam 29 with robust Radin 2.

The central item of the pineapple canning exhibit dealt with the proposed Malayan Mark Grading Scheme. A brief description of the Scheme, samples of graded produce, and the chosen design for the Mark, were exhibited.

The demand for pineapple juice is increasing rapidly and an account was displayed of the measures which must be taken to ensure a high-quality product.

The method of testing the quality of the tinsplate used in can-making was demonstrated.

Photographs of new factories, designed on model lines, together with views showing the latest methods of cultivation of this crop were also shown.

The derris exhibit had for its main object a comparison of the more important varieties from a commercial standpoint. Living specimens demonstrated the botanical differences between the varieties, while jars containing freshly-rooted cuttings indicated their rooting propensities. Miniature bales of the dried root, similar in shape to those exported, were also exhibited together with specimens of ground root and rotenone. At present, root containing a large percentage of rotenone commands the highest price and a chart was shown giving details of the variations in rotenone content of the varieties of derris exhibited. A leaflet recently issued by the Department giving a general account of this crop in all its aspects was available for distribution.

Departmental publications in English were on sale, and publications in Malay, Chinese and Tamil were distributed.

The Rubber Research Institute of Malaya.

The stand of the Institute was principally occupied with the exhibits in the All-Malayan Rubber Competition, and in addition, photographs of typical aspects of the rubber plantation industry were on view.

The new premises of the Institute, situated near the Exhibition grounds, constituted the main exhibit. A total of 307 visitors inspected the new buildings and were able to see the actual work in progress in the laboratories where special displays of apparatus and specimens were arranged.

Medical Department.

The exhibits staged by the Medical Department were grouped in two main sections: Public Health, sub-divided into two groups—(1) General Sanitation and (2) Anti-Malarial; Maternity and Child Welfare. There were numerous interesting models and posters demonstrating correct as opposed to incorrect methods of procedure in all matters relating to health, and explanations and demonstrations were given by members of the Department.

The total number of visitors in this section was 17,853.

Other Government Departments.

The Posts & Telegraphs Department provided a post office giving all the usual facilities, and also staged several extremely interesting working instruments demonstrating various aspects of the service available in Malaya. An interesting exhibit was a model of the "C" class flying boats of Imperial Airways which will be used on the Malayan air-mail service.

The Federated Malay States Railways shewed the latest type Second Class accommodation and also had on view a large plan depicting the air-conditioned coaches now in use.

The Electrical Department had an attractively designed stall to demonstrate the correct illumination required for a room, together with working models whereby visitors could ascertain the power required for reading purposes.

The Co-operative Societies Department again organized the Village

Industries Section and also provided free cinema shows of propaganda films of agricultural interest.

General.

The Trade Section was the smallest for several years, but the stalls were attractively laid out and designed.

The Y.W.C.A. again provided a rest-room for women which was much appreciated.

An Inter-Malay Football Competition was played for the Gold Cup presented by Their Highnesses the Rulers of the Federated Malay States, and a cycling carnival was held in the evenings.

Traffic arrangements and all parking grounds were under the control of the Police, and that Department is to be congratulated on the efficiency of its organization. The Boy Scouts Association again rendered valuable services throughout the Exhibition.

Acknowledgment.

The writer acknowledges with many thanks the assistance given by officers of the Department of Agriculture and of the Rubber Research Institute of Malaya in the compilation of this report.

MALAYAN CHRISTMAS HAMPERS.

The Association is again, for the fifth year, making arrangements for the supply of Christmas hampers of Malayan produce. The following is a list of the articles to be included in the hamper:—

2 tins coffee, 2 tins tea, 2 tins Malayan pineapples, 1 Brazil nut fruit, 1 bottle mango chutney, 1 pair Kelantan silver cuff-links, 1 pair Kelantan cushion covers, 2 Malayan pewter ash trays, 1 Port Dickson bag, 1 Malayan tin paper weight.

Full particulars and order forms can be obtained from the Secretary, Malayan Agri-Horticultural Association, 8, Barrack Road, Kuala Lumpur.

Horticulture.

THE GENUS STIGMAPHYLLON

BY

R. E. HOLTUM, M.A., F.L.S.,
Director of Gardens, S.S.

This is a group of about 60 species of climbing plants, native from Mexico southwards through the American tropics. Two species are fairly common in Malayan gardens, and three others have been successfully introduced to cultivation in Singapore. All five species are quite worth growing for ornamental purposes, having pretty yellow flowers which are borne quite freely. A short account of them is therefore desirable.

The genus *Stigmaphyllon* belongs to the family *Malpighiaceae*, named after the 17th century Italian anatomist Malpighi, who was also a pioneer in the study of plant anatomy. This family is confined to the tropics. The commonest garden plants belonging to it, apart from the *Stigmaphyllons*, are the yellow climber *Tristellateia*, and the small yellow-flowered bush *Galphimia*. The easiest character for recognizing the family is the way in which the five petals are distinctly stalked. The petals also are usually more or less rounded and often crinkled. The leaves are usually small and simple, in opposite pairs. The fruits are often very curiously and elaborately winged. Those of *Tristellateia*, a common climber in local mangrove, are specially adapted to float. *Tristellateia* is a sufficiently important garden plant to warrant a special article which appears on page 174 of this issue.

The two best known species of *Stigmaphyllon* are slender climbers: the other three tend to be more woody. All climb by twining round their supports. The more slender species have thin leaves; the more woody species have rather thick tough leaves, usually of smaller size. The flowers of all are similar, and present some rather striking features, which may be mentioned for the benefit of those readers who are interested.

There are five sepals, four of which have curious swollen glands on their backs near the base; the fifth has no glands. The tips of the sepals project upwards between the narrow stalked bases of the petals. The petals of all species here mentioned are yellow, have stalks about 2 mm. long, the blade being almost round, slightly cup-shaped, the edges crinkled and slightly toothed. They are not quite all equal in size. There are ten stamens to each flower but only six are fertile, and of these, three are much larger than the others. The three green styles are prominent in the centre of the flower, the one opposite the glandless sepal being different from the other two. At the apex of each style, beside the small stigma, are usually little flat green appendages, like minute leaves; these give the name *Stigmaphyllon* to the genus (*phyllon* means a leaf; hence

stigma-leaf). The fruits when ripe have wings, something like miniature maple-fruits (especially *S. diversifolium*). Each winged part has a single seed in it.

The illustrations give some idea of the habit and flowers of two species. The principal characters of the five locally grown may be summarised as follows:

***S. ciliatum*.** Slender climber. Leaves light green, the base strongly heart-shaped, the edges when young bearing slender spreading purple hairs. Flowers deep yellow, an inch across. Fruit wings $\frac{1}{2}$ inch long and broad, tip acute. Distribution: Mexico to Uruguay.

***S. ellipticum*.** Leaves elliptical with broad base and pointed apex, commonly about $3 \times 1\frac{1}{2}$ inches, thin but firm in texture, only hairy when very young. Flowers much as in *S. ciliatum*, but paler. Fruits with narrow wing an inch long. Distribution: Mexico to Colombia.

***S. sagraeanum*.** Stem when old quite thick and woody. Leaves very tough, all veins prominent beneath, varying somewhat in shape but usually narrowly elliptical, the tip not acute, the edges very slightly notched, commonly about 3 inches long and $1\frac{1}{4}$ inches wide. Flowers in rather close heads of 12 or more, on slender stalks, rather smaller than the above species, lemon yellow with purplish sepals. Fruits not often produced in Singapore; wing $\frac{3}{4}$ inch long, dark red, with broad end. Distribution: Cuba.

***S. diversifolium*.** Leaves tough; those of climbing stems very narrow, often only $\frac{1}{4}$ inch wide; leaves of short free branches more or less ovate, commonly 2 inches long, $\frac{3}{4}$ inch wide, apex acute, surfaces densely pale-hairy when young, hairless later. Flowers about same size as those of *S. sagraeanum*, pale yellow. Fruits with a rather broad wing $\frac{1}{2}$ inch long. Distribution: Cuba and Haiti.

***S. periplocifolium*.** Leaves varying a good deal, very harsh in texture, usually almost oblong with a broad blunt end (the apex minutely pointed), commonly about $2\frac{1}{2}$ by 1 inch, veins very prominent below. Flowers nearly as large as those of *S. ciliatum* and of about the same colour. Fruit much like that of *S. diversifolium*. Distribution: West Indies.

The most generally useful species are *S. ciliatum* and *S. ellipticum*; these make excellent cover for wire netting screens, as they do not tend to become massed at the top. Both flower fairly freely, and the flowers are very dainty and attractive. They are not very good for cutting, as the side shoots which bear the flower are rather short, and the number of flowers in a bunch is small.

S. sagraeanum (which was introduced a good many years ago to Singapore with the wrong name *Heteropteris laurifolia*) has more the habit of a Congea. Its close bunches of lemon yellow flowers, with the touch of purple provided by the sepals, are very attractive, and are produced fairly freely. It is not so rapid in growth as some climbers, but responds well to manuring. It is probably the best species for cut flowers.



Stigmaphyllon periplocifolium.



Stigmaphyllon ellipticum.

S. periplocifolium has not been long in cultivation here. It seems likely to have a similar woody habit to *S. sagraeanum*, and to flower at least as freely. Its very stiff almost oblong leaves are unusual.

S. diversifolium is also a recent introduction. It is apparently less woody than *S. sagraeanum*, and it has a very close neat foliage which is attractive. It could probably be trained satisfactorily on a wire fence, but is not so rapid in giving cover as *S. ciliatum* and *S. ellipticum*.

All species are quite easily propagated by cuttings, but naturally seeds may also be used if desired. The plants need no special cultural treatment other than good soil, a sunny place, and adequate support of some kind. *S. ciliatum* and *S. lancifolium* will flower when not receiving full sun, but the others apparently not.

OUR FERN HOUSE

BY

DOREEN INGATE.

After visiting the Singapore and Hongkong Botanical Gardens, and seeing photographs of Peradeniya Gardens, we were ambitious enough to want a fern house of our own.

We appealed to the M.A.H.A. for suggestions for the construction of the building and in reply detailed sketches and information were very kindly supplied.

Working on the same principles we constructed our own fern house, although the design is different. The building is to be permanent so bilian has been used throughout. The house itself is hexagonal in shape, each side measuring 12 feet wide and 8 feet high. It is entirely constructed of 3 inch wide bilian laths placed about two inches apart, with the panels in herring-bone design, and the gradually sloping roof in spider-web design finished off at the top with a roughly carved pinnacle. The laths being placed slightly apart allow of a certain amount of rain and shadowy sunshine to enter the house from the roof and sides. The laths are all nailed with "Evenden" large headed galvanized nails giving a simple and artistic effect of silvery studs. To give a rough idea of the house I should mention that before it was completely finished it resembled a bandstand !

The timber has all been left natural, that is rough sawn and unpainted. The main support runs up through the centre of the house, but this is to some extent hidden by orchids which grow up it from the pots in which they are planted.

As a foundation on which the wooden structure stands we had a low stone wall built all the way round. This wall is made of rough pieces of a local stone not unlike granite, joined together by cement, and is approximately eighteen inches high at the lowest level of the house, rising to two and three feet on the further side of the house where the ground slopes down-hill. A flight of three wide shallow steps, also in rough stone to match the foundation wall, leads up to the fern house door. A low wall runs down each side of the steps ending in a square block of stone work on which a pair of stone vases stands. In these vases we hope to grow hydrangeas.

The door of the fern house is made to match the rest of the panelling, and when closed forms a complete hexagon with only a handle, lock and key to distinguish it from the other panels.

We have made earth beds inside the house all round the six sides, and our soil being almost entirely all clay, it had to be dug out, carried away, and replaced by good rich loam. The back walls of the bed are formed by the inside of the granite foundation wall into which short lengths of bamboo were inserted to act as formers for draining. The front of the beds are bordered by a low stone

coping also in the same rough stone. These beds are continuous round the six panels and are planted up with an assortment of ferns, palms, calladiums, anthuriums and other similar plants. (See plates of views of orchid house and fernery, Peradeniya Gardens, in Macmillan's Handbook of Tropical Gardening and Planting). At present these beds are sparsely planted as the fern house has not been built long yet, but we hope the final effect will resemble the above mentioned plates.

Round the centre is an hexagonal bilian plant stand, three tiers high, for pot plants. On the top tier are the pots of terrestrial orchids which are supported against the main post of the house, incidentally to hide it.

Between the bed running round the inside of the house and the plant stand in the centre there is a path a few feet wide. As this was made with earth added to the foundation to make the surface level, it has not yet sunk sufficiently to do anything permanent with, but we hope later to make a stone or paved path as at present in wet weather it is very slippery.

In order to utilize all available space and well fill the house which should appear as a cool mass of greenery, we have made a wooden shelf well above the earth beds to clear the tops of the palms, calladiums etc. On this shelf are also pot plants.

Lastly, hanging from the radii of the roof are assorted decorative wire baskets containing trailing orchids, ferns, and other similar plants. Also Japanese fern designs. The whole effect as one enters the house is one of "coolth" and shade, with its mass of ferns and palms. The original letter of suggestions and sketches for a fern house described a fountain in the centre. We should have liked one too, but the shape of the house did not permit of this, nor would our local water supply, water being a problem where we are living. However, the idea appealed to us strongly.

There is, however, one pitfall to avoid in constructing such a fern house as ours, and which unfortunately we did not allow for, and that is its size. When the fern house was completed but still empty of plants it looked more than sufficient for our needs, but when we started to fill it up we found that even with our limited number of plants we could have almost filled a house twice the size. At the time of building it could have been made larger for very little more expense, but now unfortunately, owing to its shape it would be difficult to extend.

However, in spite of this it is a great pleasure to us, and we spend many hours working in it in the evenings.

Apart from being somewhere just to house our ferns, palms, and orchids, and provide us with a hobby, we have found that the plants themselves, particularly the maidenhair and asparagus ferns, have improved considerably, to say nothing of the anthuriums. The plants we have on our bungalow verandah are put back into the fern house every week and exchanged for others. This keeps them fresh and healthy, and in good condition generally as the atmosphere of the fern house is as much like that of their native habitat as we can provide.

THE CALAPPA PALM

BY

J. N. MILSUM, F.L.S.,

Department of Agriculture, S.S. & F.M.S.

Those who are called upon to judge arecanuts at an agricultural show are often confronted with a large spadix of deep orange-red fruits. Although it is fairly obvious that the specimens are not true arecanuts the colour of the fruits is so striking that one is tempted to award the exhibit a prize. Upon enquiry a variety of Malay names is forthcoming. The fruit may be named *pinang bali*, *pinang hantu*, *pinang hutan*, *pinang penawar* or *pinang sinawar*, according to the fancy of the informant. It appears to be used for medicinal purposes but there is doubt about its fitness for chewing. Malays say there are a number of superstitions about the fruit, and some of these are dealt with later on.

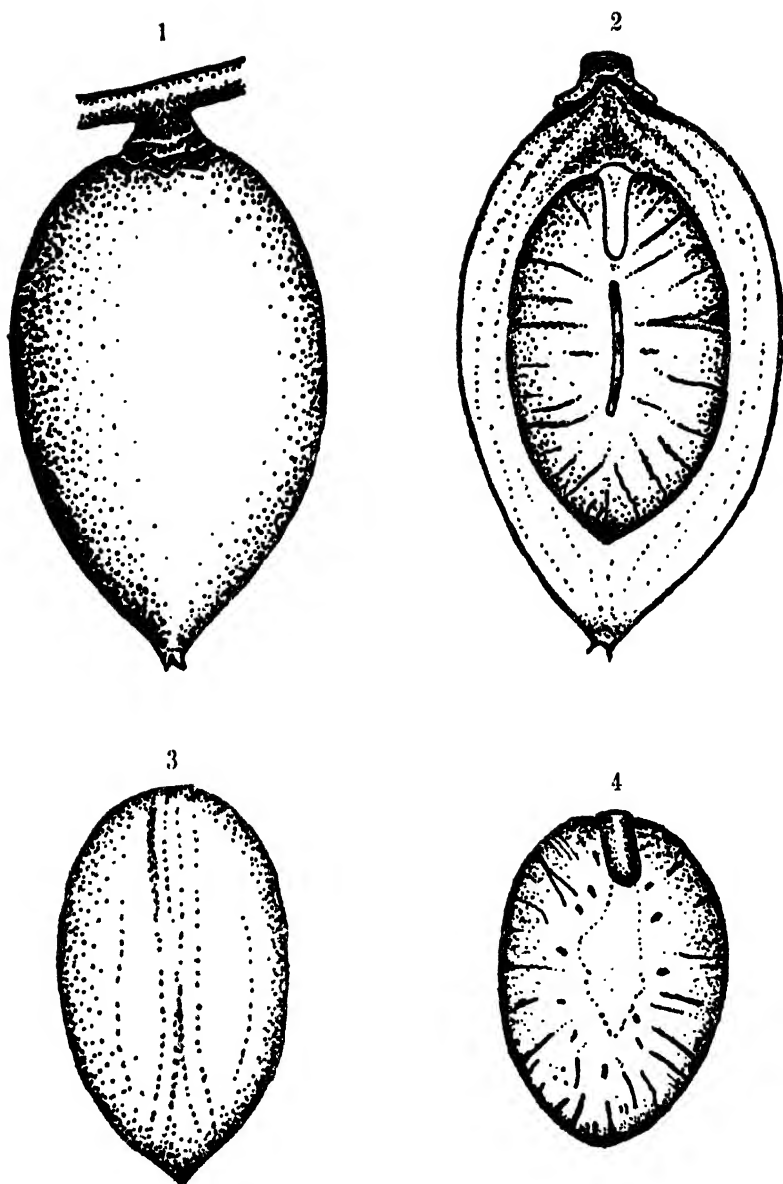
The fruit is that of *Actinorhysis calapparia*, the Calappa palm, belonging to a genus of the family Palmae containing only one species. Botanically it is closely allied to *Areca* but differs in having male flowers produced in pairs on either side of a female flower on the lower parts of the spadix-branches with solitary male flowers above. In the genus *Areca* the male flowers are on the tips of the spadix-branches with female flowers at the base.

The palm is similar in appearance to the arecanut palm. It is tall-growing with a single stout stem surmounted by a crown of dark green pinnate leaves. A palm eleven years old was examined and found to be 45 feet high, to the apex of the crown of leaves, which is about the same rate of growth made by arecanut palms, *i.e.* 4 feet per annum. The spadix is large and produced below the leaves. The fruit is about the size of a duck's egg, ovate, surrounded at the base by the perianth, at the apex presenting the three dried-up styles. The outside skin is thin and the pericarp fibrous. It is orange-coloured at first and upon ripening turns a beautiful deep orange-red colour with a pale bloom. The nut is pointed at one end but upon drying it becomes almost round and deep red-brown in colour. Major C. D. V. Georgi, of the Department of Agriculture, analysed a sample of fruits obtained from Port Swettenham. He found the proportions of pericarp and nut were 47 and 53 per cent. respectively and yield of air-dry nut on fresh fruit 27.6 per cent. The fresh fruit weighs approximately 80 gms. and the air-dry nut 22 gms.

As will be seen from the accompanying illustration the fruiting spadix has a stout butt, shaped not unlike a Malay *keris* handle. The butt fits closely against the stem of the palm and acts as a lever, thus preventing the heavy bunch of ripe fruit from breaking away from the stem. The line drawings illustrate the fruit and nut, the latter differing from the arecanut in its deep red-brown colour.



Actinorhynchis calapparia. Fructing Spadix (Reduced).



Actinorhysis calapparia.

- | | |
|------------------|---------------------------|
| (1) Ripe fruit. | (2) Fruit in section. |
| (3) Seed or nut. | (4) Dried nut in section. |

(All natural size)

The palm is seen in *kampong** and on land near villages and, although not actually cultivated, Malays sometimes plant a few fruits and allow a seedling or two to grow. It has a wide distribution in the East Indies, being known from Sumatra to the Moluccas. Its origin, however, appears to be uncertain. There are a few palms established at the Coconut Experiment Station, Port Swettenham; from these, seedlings have been raised and planted in the Public Gardens, Kuala Lumpur, and elsewhere.

Its uses are several but not important. Mr. W. N. Sands, writing in the *Malayan Agricultural Journal*, Vol. XIV, p. 207, states that the sliced and boiled nut mixed with ginger, pulverized sea-shells and coconut oil is used solely for the manufacture of a liniment. He also states that the mature nut if chewed in a fresh condition is said to act as a poison. Mr. I. H. Burkill, in his *Dictionary of Economic Products*, records several uses for the fruit. The young nut is sometimes used instead of arecanut for chewing, and although tough is pleasant to the taste. The ripe nut is considered to have medicinal properties.

Since there is a paucity of information regarding *pinang penawar*, I enquired of Inche Haji Wahid, of the Department of Agriculture, regarding it. He has kindly supplied me with the following information. The name in Malay means that it is "antidote, curing or treatment" arecanut. According to Malay belief the nut may be used in the treatment of ailments attributed to *hantu* or devil-sickness. These are known to *kampong* Malays as follows—*bajang*, *pelesit*, *penangal*, *polong*, and *santau*. In dealing with these ailments, the fruit is sliced and chewed by the Malay *pawang*† together with certain root spices, such as turmeric, and blown upon the invalid. *Pinang penawar* is supposed to be regarded with the greatest awe by evil spirits.

In the Malay Archipelago the nut is considered to be a talisman or *tangkal* capable of warding off all evil spirits. It is not uncommon to see the dried nut cut into conventional shapes, set in gold or silver, and worn as a pendant by Malay children. It serves a double purpose, being an ornament in addition to protecting them from evil spirits, but is rarely worn by adults. This talisman is conspicuous at festivals or when there is sickness in the *kampong*.

Cultivation is the same as for the arecanut palm. The entire fruit is sown in a shaded nursery bed. When the seedlings are a foot or so high they are transplanted with a ball of soil adhering to the roots. The palms look well in a small group or they may be planted in line, about 10 feet apart, in order to provide living posts for a boundary fence. A *kampong* so guarded should, one supposes, be safe both from *hantu* and other denizens of the forest.

* *Kampong* = Malay village.

† *Pawang* = Medicine-man.

LOCAL PLANT GEOGRAPHY *

BY

REV. NIGEL WILLIAMS.

The scope of this paper will be readily understood if I explain the reasons for writing it; but by way of a preliminary disclaimer, let me say that it is purely exploratory and amateur, teaches nothing, but I hope will provoke and stimulate.

During the past eight years I have moved about in this country probably as much as the average resident and over a wider area than most. In every place where I have been I have tried to take an interest in garden affairs, and in some I have even tried to be a gardener. For all who move about, but love a garden a very real problem is: What will grow here and what will grow to best advantage?

A kindred question is: What does grow here? The questions are diverse of course, for the greater part of the plants which fill our gardens do not grow of their own accord, but are importations, and what *will* grow is not of necessity the same as what *does* grow.

My last garden was in Taiping, with abundant and very heavy rain, and a soil of pure sand, a legacy from some worked-out mine, but by no means a bad soil once the gardener could be persuaded not to present every scrap of green refuse to the Municipality for removal. Lacking the time and skill necessary for expert gardening I had to confine my attention to what grew easily and well in the circumstances—the ubiquitous *Canna* of course, bushes of *Kopsia* which grew and flowered excellently, several beds of the White Spider Lily (*Hymenocallis*), *Gloriosa superba*, and *Thunbergia grandiflora*—both blue and white. The last named was rather a nuisance, in fact. I took *Gloriosa virescens* with me and it did very well, too, but strangely enough I do not remember having seen it anywhere else north of Johore Bahru. Of the other common plants *Angelonia* did not do very well and *Gomphrena* was the most useful ingredient in my strip of permanent border: *Zephyranthes* did not do very well. The common composites did well, and I believe will grow reasonably well almost anywhere in Malaya—*Cosmos*, *Helianthus*, *Tithonia*, *Gaillardia*, *Zinnia*; the last named suffered much from heavy rain, however. The perennial *Helianthus angustifolius* grew and flowered very well in the open, in rotation with balsams.

A Singapore favourite, *Heliconia*, grew very well and seems likely to be popular in the north for I have noted it growing well near Sungei Patani. My last useful plant was *Wedelia*, which is grown here, but is rare in the north: it grew very well with me and flowered continuously, though strangely enough in Kuala Kangsar a friend had it but could make it do nothing.

* An address given to the Singapore Gardening Society on June 14th, 1937.

North of Taiping, in Butterworth, by the sea, I note Oleander and the white Lantana. Oleander I do not think worth bothering with except by the sea and where there are well marked seasons: it flowers quite well in Java, but I do not remember having seen a single bush growing inland in Malaya which was worth looking at twice. I had no success with the white Lantana in Taiping, but a friend nearby grew it well till his garden was flooded, when the plant died.

Further north still, in Kedah, where the seasons are more distinctly marked than they are here, I have noted for particular reference only the yellow *Zephyranthes* (extremely common in Alor Star gardens), *Asystasia*, which grows freely, wild, about Kulim, and *Haemanthus* which appears in many Alor Star gardens growing in the open, whereas I have known it elsewhere only as a pot plant. The common *Amaryllis*, which is such a wonderful sight in Batavia at the end of the dry weather does not seem to be used as much as it should in Kedah: elsewhere I do not think it is worth space in the open, but only as a pot plant. In Perlis the pretty little *Kaempferia* grows wild and can be acclimatized: there is a finer species which I grew in a pot in Taiping and have seen growing well in Penang and Batu Gajah, but do not remember having seen elsewhere. Pot plants are of course a problem in themselves: what I believe to be quite the best flower for a hanging pot, *Achimenes*, does not seem to be grown at all in Singapore, and the Botanic Gardens do not supply it. It grows well, however in Kedah and Perak: I have seen a number of varieties in Malacca.

The scarlet flowered *Episcia* is a familiar plant everywhere, but the blue one, *E. Chontalensis*, though introduced in Singapore during last century seems to have died out here, and I have seen it only in Penang. *Cuphea miniata* I believe is a fairly recent introduction: there were pots of it at the last Show here, and I have seen it growing in Kuala Kangsar and Sungai Siput and it is known in Kuala Lumpur. *Tussacia* was described about three years ago in *The M.A.H.A. Magazine*, but the only plant I have seen was in Alor Star whither it had come from Batu Gajah. It grew very gaily in pots but jibbed at the open border in Taiping, and also in Sungai Siput where a friend tried it. *Anthurium cristallinum* is fairly common everywhere but the *Anthurium* with a crimson spathe so much grown here I do not remember having seen up-country. Similarly I have seen the white-flowered *Clerodendron nutans* here, and once in Ipoh and once in Taiping but nowhere else.

Orchids: in Taiping *Arundina* grew very well, (it grows wild in the district), *Vanda* Miss Joaquim and species of *Spathoglottis* are ubiquitous, but the White Scorpion, *Arachnis Hookeriana*, seems to be taking a very long time to get established in up-country gardens. I tried the common sorts of *Phalaenopsis* in Taiping quite successfully, but, though *Ph. violacea* grows wild near Telok Anson it and *grandiflora* are comparatively uncommon in houses. I hardly expected *Dendrobiums* to do well in Taiping and the few I tried did not, while *Oncidiums sphacelatum* and *flexuosum* likewise were disappointing: they

are not at all common in the north but perhaps orchids generally are eschewed by the ordinary amateur.

It is interesting to note that *Vanda teres* appears in Kedah gardens, and is, of course, the sort which is grown in Java in preference to our local hybrid.

I am sorry if this paper has been diffuse. The conclusion to which I wish to lead is that it would be useful to obtain information from gardeners in different localities in the Peninsula on what grows best in each place—making due allowance for varying soils, sites and methods of cultivation—and how the commoner plants, *e.g.* those listed in Mrs. Gough's book, perform. And yet, perhaps the hardened gardener will never be content with the easy way but will prefer adventurous failure to a cautious success.

THE NAMES OF GARDEN PLANTS *

BY

R. E. HOLTUM, M.A., F.L.S.,

Director of Gardens, S.S.

Many gardeners regard the names of their plants as a troublesome subject, and one not to be worried about very seriously. But nobody can pursue his gardening very far without coming up against the necessity of names. It is for example impossible to order plants from a catalogue unless one knows what the names mean, and unless one is reasonably certain that the same name always means the same kind of plant. But there are so many plants in the world that the problem of naming them is a very complex one, and there are often difficulties in finding the correct names for individual plants. Thus the question of names is one of great importance for the gardener, and also by no means an easy one. In this address I shall attempt to give some account of the history and meaning of plant names.

There are two kinds of names; popular or local names and botanical names. The essential difference between the two is that local names are useful only locally, whereas botanical names are international; botanical names also are constructed on a definite plan, and are usually of Greek or Latin origin, written in Latin form. It is about botanical names chiefly that I wish to speak, but I will begin by some remarks on popular names.

Popular names are less formal than botanical names, and pleasant to use, and, therefore, they should be encouraged to such a degree as is practicable; but it will always be found that they can only be made to apply to a limited number of common and well known plants. They are valuable to the extent that they are well recognized in their meaning. But they are essentially local, and it often happens that the same popular name means something different in different parts of the world, and the same plant rarely has the same popular name in different countries. This causes confusion if one is communicating with a person in another country. As an example, let us take the cherry tree. The tree locally so-called is not a cherry in the proper English sense of the word at all, but a plant of the linden family native in the West Indies (its botanical name is *Muntingia*). Neither has it any relationship with the Japanese cherry, though it is often so called. As a converse example, take *Flame of the Forest*. In India it is called the *Gold Mohur tree*, and in many countries the *Flamboyant*, but I have not come across another place where it has the name used in Malaya. It appears that the name *Flame of the Forest* is used for a quite different tree in Burma and India; this tree is a relative of the *Dadap* (*Erythrina*), and is truly a forest tree, which the *Flamboyant* is not. Then there is the plant so well known to Malayan gardeners as *Honolulu*, for what

* Substance of a lecture given to the Gardening Societies of Selangor and Singapore.

reason I have never discovered. It is a native of Central America, known in West Indian gardens, and probably also in Honolulu, as *Corallita*.

The other difficulty with local names is in the case of big genera, such as *Dendrobium* and *Rhododendron*, in which the cultivated species run to scores or even hundreds. It is impossible to find a popular name for each of the different species, as is recognized in practice by orchid growers, who have never attempted to find a different popular name for every kind of *Dendrobium*. In some books one finds an attempt to translate the botanical names into English as a substitute for popular names, but this practice is not very satisfactory, and I do not think that many people use the names. For example, in a recent book on the common flowering trees of India, *Peltophorum ferrugineum* (well known as a street tree in Singapore and called *Batai* in Malay) is called "The Rusty Shield-bearer", a literal translation of the Latin words. But how many people use that name?

We therefore come to botanical names as in many cases unescapable. It is often stated that these names are difficult to pronounce and to remember and often uncouth in sound. The last charge is unfortunately well founded in some cases, but not in the majority. The names are thought difficult chiefly because they are unfamiliar, but once they are known they are found no more difficult than any other words. For example, *Chrysanthemum*, *Rhododendron*, *Antirrhinum* and *Delphinium*, characteristic botanical names of Greek origin, are well known and freely used by most people.

At this point it may be well to explain that botanical names always consist of two parts: the first part is the name of the genus, the second the name of the species. A genus is a group of different kinds of plants which yet are obviously related to each other, such as, for example, the different kinds of *Ixora* grown in local gardens; all belong to the genus *Ixora*, but each has its different specific name added in the form of an adjective, as *Ixora macrothyrsa*, *Ixora congesta*, *Ixora javanica*, *Ixora coccinea* etc. This system, which is very convenient, was first standardized by Linnaeus in the middle of the 18th century.

But European books about plants began long before Linnaeus, and many of the names he used were taken from those earlier books. European botany really begins with Theophrastus, a pupil of Aristotle, who flourished about the year 300 B.C. He wrote two books, in which he described and named some 500 different kinds of plants. The next author to make any considerable contribution to the subject was Dioscorides, who flourished in the first century A.D. in Asia Minor. Dioscorides, like so many men who studied plants in later times, was a medical man who needed them for preparing drugs, and his works, unlike those of Theophrastus, reflect this special interest. He needed to be able to identify and name plants so as to be sure of his correct drugs. This work of Dioscorides had a profound influence for many centuries. It was translated by Arabic scholars and through them reached the mediaeval schoolmen, and with Theophrastus formed the basis of the work of the first Renaissance botanists, who, like Dioscorides, were nearly all physicians, and wrote works which were

called Herbals. The first great herbal was by Otto Brunfels, and is illustrated by a large number of very beautiful woodcuts, the art of the woodcut reaching its high water mark about this time. The text however is not so good, being derived not from the living plants but copied largely from Dioscorides. The first herbalists in fact tried to identify the plants they knew with those described by the classical authors; but it was soon found that there were a lot of plants which could not be so identified, and these were in course of time described and named, thus turning men's thoughts from the written words of the ancients to the living plants. Most of these herbals were written in Latin, though from the 16th century some were translated into German, English, Dutch, etc. The names of the plants were of course at first the Greek names of the classical authors, so that nearly all of these gained currency, and the new names were made after the same pattern. Many names consisted of several words, almost amounting to a short description of the plant. By 1623 a large number of new names had been made, and in the absence of any general agreement as to procedure there was already some confusion, which Bauhin attempted to put straight by publishing a list of all known names, indicating equivalents.

The discovery of new countries by the active explorations of the 16th and 17th centuries brought also the discovery of many new kinds of plants which in their turn were described. These naturally in many cases had no relationships to any European plants, and so had to have entirely new names. In some cases these names were given in honour of the herbalists who revived the study of plants, and so we have Brunfelsia, Fuchsia, Lobelia, Matthiola, Duranta, Gesnera, Bauhinia, Ruellia, Turnera etc.

Meanwhile ideas about classification had been slowly developing; flowers were studied and the process of pollination discovered by the end of the 17th century. The idea of genera thus took more definite shape, and the time was ripe for the systematic mind of Linnaeus to bring order into the system of nomenclature. He was the first man to give every known kind of plant a binomial name of the kind we use to-day. He carefully went over the work of his predecessors, quoting their books to show exactly what he meant, and in many cases adopting their names. His list of names is the basis of modern nomenclature, and is accepted as such by botanists in all countries of the world.

Thus we see how it came about that plants were given names in a Latinised form, and binomial in type. All these names have a history and a meaning, and it often helps one to remember a name, and adds to its interest, if the history and meaning are known. In many books such data are not given, but there has lately been published a Dutch work on the subject, which I have used in preparing the following remarks. Generic names may be divided into four classes as regards their meaning: first, those which are classical names; second, those derived from vernacular names in various countries; third, those derived from names of persons; fourth, those derived from some character of the plant itself. I will give a few examples of each class.

A very large number of European plants naturally still have classical

names. Many of these are well known garden plants, and a few of them are found in Malayan gardens. Of the latter we may note *Asparagus*, *Cassia*, *Clematis*, *Juniperus*, *Nerium*, *Nymphaea*, *Plumbago*, *Portulaca*, *Salvia*, *Verbena* and *Viola*. These names have been current for the plants in question for two millenia. A number of other classical names were apparently transferred from the plants they originally denoted to other plants; among these are *Acalypha*, *Cactus*, and *Canna*.

Explorers in new countries often wrote down, sometimes not very accurately, the local names of the plants they found. These names were sometimes Latinised by the botanists who described the plants. Such Latinised vernacular names of Malayan garden plants include: *Caladium*, *Durio*, and *Pandanus*, of Malay origin; *Angelonia*, *Anona*, *Araucaria*, *Hevea*, *Jacaranda* and *Petunia* from South America; *Congea*, *Datura*, *Mussaenda*, *Nelumbium*, *Saraca* and *Vanda* from India and Ceylon.

Names derived from personal names form a longer list, and we can only mention a few. *Allamanda* was named after a man who went to Surinam in 1770 and collected plants there. *Amherstia* was named in honour of the wife and daughter of Lord Amherst, Governor General of India. The ladies made a herbarium of interesting plant specimens. *Bauhinia* is named after the two brothers Johann and Kaspar Bauhin, herbalists of the 16th-17th centuries; *Begonia* after Michael Bégon, a 17th century French colonial official in the West Indies; *Caesalpinia* after A. Caesalpino, a 16th century Italian botanist who tried to classify plants by their seeds; *Gardenia* after A. Garden, an American medical man and botanist of the 18th century; *Lobelia* after Matthias de l'Obel, 16th century Netherlands herbalist, who tried to classify plants from their leaves; *Petrea* after Baron Petre, who had a garden of interesting exotic plants at Thorndon, Essex, at the beginning of the 18th century; *Randia* after a curator of the Chelsea Physic Garden in the 18th century; *Plumeria* after Charles Plumier, a Franciscan Father who made three journeys to the West Indies and wrote works on the plants of that region.

Names derived from some character of the plant are the largest class. *Achimenes* means "no wintry weather", coming from a climate with no cold season. *Beloperone* means "pointed dart", because part of the stamen is somewhat of that shape. *Calanthe* means "beautiful flower." *Chonemorpha* means "funnel-shaped", from the shape of the flowers. *Cochlospermum* (the Buttercup Tree) means "shell-seed", from the resemblance of the seeds to tiny shells. *Cuphea* means "humped", from the swelling at the base of the calyx, on one side. *Cynoglossum* means "hound's tongue", from the shape of the leaf of the common European species. *Episcia* means "shady", the plant growing in a shady place. *Hedychium* means "fragrant snow-white" from its white fragrant flowers. *Phalaenopsis* is derived from a late Latin word meaning a moth, from the large white moth-like flowers. Some names have a rather unpleasant meaning, such as *Croton* meaning a tick, from the shape of the seeds; and *Coreopsis* means a bug, for the same reason.

The specific name of each different kind of plant in a genus is most usually derived from some character of the plant, such as *macrophylla* (large-leaved), *grandiflora* (large-flowered), *alba* (white) etc. Sometimes it is derived from the country from which the plant first came, as *chinensis*, *javanica* etc. Sometimes it is derived from the name of the man who first found it; in this way the names of most of the botanical explorers of all countries have been perpetuated.

It often happens that the same kind of plant is given a different name by different authors; also sometimes the same name is accidentally given to two different kinds of plants. It is necessary to have rules to decide the proper name for each kind of plant in such cases. Botanists of different countries have met and discussed this problem on several occasions, and the general principle agreed is that each kind of plant shall take the first name that was given to it with a proper description from which it can be certainly identified. This raises a difficulty in some cases, as the early authors did not describe their plants very thoroughly. Then there are complications when the ideas of botanists about genera change, so that a species must be transferred from one genus to another. There are added complications because many well known botanists of the 19th century worked on a scheme not identical with that now agreed upon, so that their names, often well known, have to be altered. It is hoped, however, that by adhering strictly to the rules botanists will arrive at a really settled nomenclature so that no more changes will be needed. The principles are simple but in practice there are many difficulties, and I am afraid we shall have to face changes for many years to come.

Finally, a word about varieties and hybrids which have been produced in gardens and have no counterpart in nature. It is agreed to give such varieties fancy names in a non-Latin form, so as to distinguish them from natural species. There is unfortunately by no means the same regulation about the publication of these names that exists for botanical names, and therefore a lot of fancy names for garden varieties are of doubtful application and difficult to trace. Take for example the varieties of *Bougainvillea* which have appeared in various parts of the world during the past 40 years. Few of these have been published with proper descriptions, so that it is difficult for us in Singapore to know whether our *Bougainvilleas* are named correctly. In fact, I think some of them are named differently from the same varieties in America.

In conclusion, I hope I have said enough to show you that the subject of the names of plants is important and also not without interest; and I would ask for a sympathetic attitude to botanists who are trying to straighten names according to the agreed rules. I would also call your attention, as I have done on a former occasion, to the fact that local garden plants in many cases have no popular names, and suggest that some effort might be made to find some. Otherwise we shall have more inappropriate names arising such as Japanese *Canna* for a plant of the *Banana* family native in South America.

MISCELLANEOUS HORTICULTURAL NOTES

The Colour of Hydrangeas.

In a recent number of the Journal of the Royal Horticultural Society (Vol. 62 pt. 7) there is a very interesting article entitled "The Problem of the Blue Hydrangea." Those who are interested are advised to read the article; a brief summary only is attempted here.

The common Hydrangea is native in China and had been cultivated in the East for centuries before its introduction to Europe towards the end of the 18th century. As early as 1796 there are published observations on the colour changes of the flowers, and many experiments have been made from time to time since that date with the object of securing a blue colour. The author of the paper under review has carried out a number of different experiments, which conclusively show that it is the presence of aluminium that invariably accompanies blue flowers, and that appropriate treatment with aluminium salts, preferably aluminium sulphate, will induce pink-flowered plants to produce blue flowers. Though it has been repeatedly asserted that iron is the necessary element for blueness, this is shown not to be the case. Though in some cases iron salts may produce blueness they are less efficient than aluminium salts, and on analysis of pink and blue flowers it is found that the former contain nearly as much iron as the latter, though far less aluminium.

The author's experiments on treatment of plants to produce blueness were chiefly done by adding aluminium sulphate crystals to the potting soil when repotting plants in the autumn, just before the winter resting period; 1½ oz. to a 6 inch pot proved effective. For a large bushy plant growing in the open, 10 lbs. of aluminium sulphate added to the soil round about, in February, was effective. Experiments with watering the salt in solution are not recorded, though some experiments by another author are mentioned, showing that frequent watering with 1 per cent. alum solution induced blue flowering. There are some natural soils that induce blue flowers, and these are all found to be decidedly acid.

As regards local practice, it is likely that our acid soils are in most cases sufficient to ensure blueness. In cases of pink flowering plants, probably the best procedure would be to water with alum or aluminium sulphate in 1 per cent. solution every few days during the month before flowering.

A New Poison for Snails and Slugs.

In the Journal of the Ministry of Agriculture (London), June 1937, is an article reporting the results of experiments on the use of "Meta" fuel as a poison for snails and slugs. Previous notes on the same subject appeared in gardening papers in the latter part of last year, and the matter has received considerable attention in England. The originator of the idea of using "Meta" in this way is unknown, but it appears that the suggestion came from South Africa.

“ Meta ” is used in the form of a poison bait, mixed with bran. The proportions recommended are 4 grams (or one stick) of “ Meta ” to 8 oz. (2 pints) of bran. This is a proportion of about 1 to 56. The bran attracts the snails and slugs, and the “ Meta ” poisons them. Paris Green has been used in a similar way, but it is not satisfactory for general use on account of its very poisonous nature. “ Meta ” is said to be “ dangerous to the health of human beings if eaten ”, and also probably to domestic animals, but it is not a deadly poison like Paris Green. It is reported that poultry have eaten the mixture without harm (in small quantities), but it is well to keep domestic animals away if possible.

Two experiments reported in the above-mentioned paper may be quoted. Four small heaps of the “ Meta ” and bran mixture were put out on February 4th, and next day 253 slugs were collected. By February 22nd the total was 850. In this case the mixture was covered with tiles to protect from rain, and under such conditions it is said to remain in good condition for as much as 6 weeks in England. A field trial of more than an acre gave an estimated catch of 50,000 to 70,000 slugs per acre.

The mixture has been tried on a small scale in Malaya and has proved equally effective. The proportions used have been $\frac{3}{4}$ oz. “ Meta ” to 2 lbs. bran. The “ Meta ” can be obtained in powder form for this purpose; or if the tablets are used they must be thoroughly crushed to powder before mixing with the bran. The dry mixture is put out in the evening in little heaps of two inches or so across, near places where snails are known to occur. In the morning a group of snails and slugs are found around each heap, in a dead or dying condition. Even the giant snails are quite incapacitated and are then easily collected. Small snails and slugs probably do even more damage to many plants than the giant snails, and are much more difficult to catch in the ordinary way. “ Meta ” is undoubtedly the easiest way of dealing with them at a moderate cost. Rice bran can be used quite satisfactorily. In the Malayan climate, when exposed to rain, the bran mixture only remains in good condition for two or three days. We have not yet tried putting it under small covers to keep off the rain. It is probable that in any case the bran would not remain long in good condition out of doors in our moist climate.

Japanese Bamboos.

There is a much greater variety of bamboos on the borders of the tropics than near the equator, and they are especially numerous in China and Japan, where they are put to an immense variety of uses. In addition to their utilitarian value, these plants have found a very definite place in the artistic life of both China and Japan. They appear frequently in pictures, and are used for decorative purposes in many ways. The Japanese in particular have selected a great many varieties of cultivated ornamental bamboos, mostly plants of moderate size, contrasting with the usual large bamboos that we know in Malaya.

The Japanese bamboos are of course suited to a much cooler climate than ours, and many of them are quite hardy in England. It was found, however, that one of them grew quite well in Singapore, and so an opportunity was taken recently to try others. In all, about eight kinds have now been planted in the Botanic Gardens, Singapore, and all have made new growth. It is early to say whether all will flourish, and it is quite likely that some of them will not reach their normal size. Even if they do not attain their best development, it seems probable that they will grow well enough to be quite attractive, and they would be useful in small formal gardens. Several of them could also be grown in a dwarfed condition as pot plants, or in miniature gardens, in the oriental manner. Among the new introductions is the black bamboo, *Phyllostachys nigra*, which has slender almost black stems.

It seems likely that many bamboos, like some of their smaller relatives the grasses, are tolerant of a wider range of climatic conditions than most woody plants, and it is well to take advantage of this fact. The common hedge bamboo, for example (*Bambusa nana*), is a Chinese species. It would be interesting to introduce more of the Chinese species for trial.

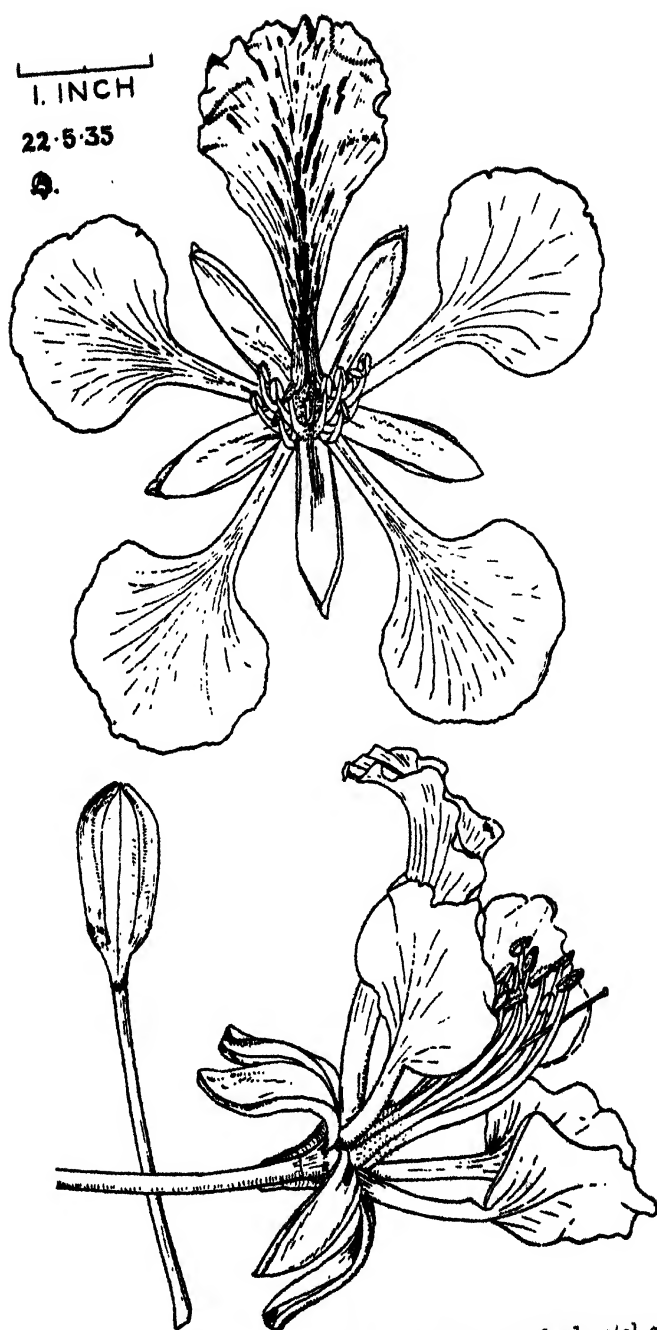
Varieties of Poinciana (Flame of the Forest).

Most people must have noticed how much difference there often is in appearance between one Poinciana tree and another. There is the same kind of difference between one rubber tree and another, but whereas the individual types of rubber tree can be perpetuated by vegetative propagation (budding) this has so far proved impossible in Poinciana, all trees of which are raised from seeds. The differences in Poinciana are most notably in size, mode of branching, and colour of the flowers. As regards size, differences are due in part to soil conditions, which determine whether a tree is vigorous or not. Differences in branching however are probably innate, and can be seen in very erect, very spreading or drooping trees. It is not easy to analyse these differences. Differences in flower colour are, however, often quite striking, especially when two different trees are seen in flower close together. In Singapore there appear to be two distinct flower types and these are described below. To what extent intermediates occur, if at all, is not known.

The two different flower types are recognized in the distance by one being more crimson and the other more orange-scarlet in colour. The crimson flowers also usually appear more massive, and are usually (always ?) found on large trees, the orange-scarlet flowers on smaller trees of more open branched habit.

The crimson flowers, when examined in the hand, are seen to be larger than the others, deeper in colour throughout, and to have a rich crimson border to the "standard" petal (the one petal that differs from the other four in all Poinciana flowers). The orange-scarlet flowers are smaller, and the standard is white without a crimson border.

When Poinciana flowers first open, the standard petal is white with red



Flower of the smaller variety of *Poinciana regia*, the standard petal at the top.
Drawing by Dr. G. A. C. Herklots.

spots, yellowish towards the base. As the flower becomes older it gradually expands more fully and each petal increases in size. The standard however rolls up, its white surface no longer visible. Each petal consists of a narrow stalk and a broad blade at the end. In the crimson type the stalk is not much larger than in the orange-scarlet, but the blade is decidedly larger. Thus the whole flower of the crimson type, besides being of a deeper colour, actually presents a considerably larger area of coloured petal surface, and thus gives a more massive effect when seen from a distance.

Measurements of newly opened flowers have been made as follows:

		Larger Type	Smaller Type.
		cm.	cm.
Petal: length of stalk	..	2.5	2.3
length of blade	..	3.0	2.7
width of blade	..	4.4	3.5

Fully expanded petals of the larger type are as much as two inches (5 cm.) across the blade.

We should welcome observations on the variation of Poinciana trees by any of our readers. An attempt will be made to grow separate batches of seedlings from different mother trees, but it will be some years before results can be obtained, and it is an experiment that will require a good deal of room to carry out. Possibly the inhabitants of Singapore will not object to such an experiment being made in two of their roads.

R. E. H.

The "Purple Emperor."

A planter friend recently sent me the fruit of this variety of papaw or papaya, and I then tasted it for the first time. The flavour resembles a cross between the ordinary papaya, and a water melon, if one can imagine the combination. In fact the flesh of this variety looks exactly like that of the water melon, being the same bright red, and of the same consistency.

The name of this papaya is evidently given it because of the leaf stems which are a deep purple in colour, and not from the colour of the fruit as one would suppose.

An interesting point about this fruit is that there are "throw backs" to the ordinary papaya, which I understand shows that the Purple Emperor is a hybrid, and we should be interested to know its parentage.

The seeds of an entire fruit of the Purple Emperor variety were planted by this friend personally, so there is no doubt that no other seed was mixed with it. Germination gave a large majority of the ordinary species of papaya, and only a small proportion of the Emperors. The seedlings as they grow are easily identified by the leaf stems being either mauve, darkening to purple later, or pale green.

Geranium.

This same friend, who is a keen amateur gardener and a member of the M.A.H.A., possesses one of the finest geranium plants I have ever seen either at Home or out East, but he is too modest to write its history ! I have, however, seen the plant with the last of a cluster of flowers, and a spray of red buds ready to open. As far as we know this is the only geranium plant in North Borneo, and certainly the only one to flower, but we are open to correction. If this is so it is an achievement indeed, especially in North Borneo, for we are neither "medium or high elevations."

Unfortunately a cutting earmarked for me died after growing well for several weeks, but I still live in hopes of getting another one from the parent plant. The seed of this plant I understand came originally from Java.

I have tried planting geranium seed from Carters Tested Seeds Ltd. Out of one packet two seeds germinated and grew to about one inch high and then for no apparent reason rotted away.

D. I.

[Plants of a scarlet-flowered Geranium are occasionally seen in Singapore gardens. They grow quite well in pots if given a well-drained soil, but probably rot very quickly if kept too wet. R.E.H.]

Tristellateia.

The rather formidable name *Tristellateia australasica* has been given to a local climber, common in the mangrove, which has been found very adaptable to garden cultivation. I do not know a common name for it, and as it belongs to an exclusively tropical family there is no well-known temperate plant to which it can be compared. The name *Trisellateia* is derived from the words meaning "three" and "star"; it was given because the fruits of the plant split up into three portions, each of which is like a little star with eight rays. There are sixteen known species of the genus, fifteen of them native of Madagascar and parts of East Africa. Our species is peculiar in that it is distributed widely in the Malayan region, and as far as Queensland and New Caledonia. It is distributed by its corky fruits which easily float in water.

Tristellateia is a relative of *Stigmaphyllon*, which is dealt with elsewhere in the present issue of this Magazine. The flowers of the two genera have a family resemblance, but those of *Stigmaphyllon* have rounded crinkly petals whereas the petals of *Tristellateia* are elongated and not crinkled. The flowers of our local plant also are borne in larger clusters and are more freely produced, so that though they may be slightly inferior in decorative value the plant is really more valuable in the garden than *Stigmaphyllon*.

Tristellateia is a rather slender climber with a thin wiry stem, the surface of which is rough with little tubercles. The thin but firm leaves are in pairs, short stalked simple, rounded at the base and gradually narrowed to the pointed tip, usually about 3 inches long and $1\frac{1}{2}$ inches wide. The veins are not very conspicuous, but are distinctly raised on the lower surface.

The flowers are borne in elongated pyramidal clusters at the ends of the branches, as many as thirty flowers in a cluster. They are clear yellow throughout when they open, except for the green sepals, but the stalks of the stamens (called "filaments") very soon turn bright red, and give a characteristic effect to the flower. There are five sepals, the tips of which curl upwards between the bases of the petals. The petals have rather stout stalks about $\frac{1}{10}$ inch long, the blade being $\frac{1}{2}$ inch long and rather less than half as wide, the base almost square and the apex rounded. There are ten stamens, those opposite the petals much larger than the others. There is usually only one style, longer than the stamens, the end curving downwards and bearing a small stigma. The ripe fruit is quite small, each of the three star-like parts being only $\frac{1}{4}$ inch across.

The flower is not quite symmetrical. The three upper petals are rather widely spaced, the two lower ones close together: the lower ones are also wider. This gives a very graceful form to the flower and adds to its beauty.

Tristellateia when well grown is one of the most free-flowering plants in the garden, and flowers almost continuously throughout the year. Seeing that it is so active, it naturally needs good treatment if it is to keep at its best all the time. The plant, growing by nature in wet ground, does not like too exposed or dry a place for its roots. A rather sheltered bed, well dug and manured occasionally, or supplied with grass cuttings, suits it well. The flowering branches naturally need light and air, and may be carried on any convenient support. It makes a very good plant to cover a porch, as it is always flowering and not too heavy in growth. *Tristellateia* is in fact one of the most useful of all local plants in the garden, and deserves recognition as such.

R. E. H.

Miscellaneous.

INSECT ARCHITECTURE

BY

N. C. E. MILLER, F.R.E.S., F.Z.S.,

Acting Senior Entomologist, Department of Agriculture, S.S. & F.M.S.

In many branches of the animal kingdom one meets with instances of the occupation by one organism of the habitation constructed by another and relinquished after it had served the purpose for which it was made, or from which the original owner had been driven by force.

There is a more or less continual struggle between representatives of what we condescendingly call the lower orders. Under the sea the hermit crab fights for the possession of an empty mollusc shell, on land, birds dispute with marked pugnacity the hunting rights over a prescribed area; certain mammals, for example the larger carnivora, jealously guard their special preserves, a fact which is aptly illustrated by the Chinese proverb "one hill cannot shelter two tigers." Large mammals also will occupy the abandoned homes of others, for example, the wart hog in Africa utilises the deserted subterranean dwelling of the ant bear, and bands of mongoose may frequently be seen entering and leaving deserted termite hills in which they have taken up their abode.

Restriction to a circumscribed area is not an insectan characteristic. Insects prefer to build their own shelters, and if they do occupy the dwelling of another insect it is only when it has been deserted, with the notable exception of those insects which live as guests or tolerated intruders in the nests of termites or ants.

The destruction of an insect by a parasite and the eventual occupation of the shelter whether nest or cocoon is in a different category, since the object of the parasite is not to destroy the occupant with a view to seizing the nest, but to provide food for its progeny.

The aim of this short article however, is not to discuss the ethics of the behaviour of animals, birds or insects, but to draw attention to a few examples of the ingenious and well-constructed homes of insects with special reference to the most familiar ones to be met with in this country.

Although the majority of insects are free living, there is a vast number which builds nests or protective coverings for the larvae, and also many larvae make use of various objects which they incorporate in the silk they secrete, and thus provide themselves with a more or less adequate protection from enemies and the elements.

First and foremost, the nest which must be familiar to all is that of the "kerengga", the ant which has, on occasion, caused considerable embarrassment to people who inadvertently walked into a colony of them on the move. From

the aesthetic standpoint there is nothing really remarkable about the nest which is composed of the leaves of a living plant. In its construction, however, marvellous ingenuity is displayed by the builders in the utilisation of the silk secreted by the larvae to bind the edges of the leaves. During this operation, a worker holds a larva firmly in its jaws, while other workers draw the edges of the leaves together. The larva to which pressure is gently applied in order to provoke the secretion of silk is shifted along the edges of the leaves so that the secreted silk comes into contact with them and so binds them together. In this method of nest construction we have an example of the sole instance, so far as I am aware, of the use of a tool by an insect.

Very familiar objects, particularly in houses, are the chambers of finely kneaded soil of several species of wasps which build them in varied and frequently unusual situations, namely in locks, behind pictures, books, and even in objects in daily use. An example of the last mentioned choice of a site was once observed by the writer when a wasp constructed a mud cell in a penholder on his desk.

Nests of these insects, (perhaps it would be more accurate to call them brood chambers) may be merely a shapeless mass of soil containing numerous cells. They may be more or less cylindrical or closely resembling spherical water jars having a neatly formed neck. All are built for the purpose of storing spiders or caterpillars to serve as food for the progeny of the wasp which deposits its eggs alongside them. So that the provisions thus stored may remain in a good state of preservation for a period coinciding with the period of the larval stage, the wasp stings its victims which, however, are not killed thereby but only paralyzed.

The preparation of hollow stems of plants or of empty snail-shells which are also appropriated for brood chambers does not perhaps entail much work on the part of the adult insects—bees—, which favour such situations.

Plant stems, nevertheless have to be suitably prepared, the walls to be cleaned of pith and scraped smooth, after which partitions are arranged to form cells in which one larva may live separated from another. Snail shells must have debris removed from them, and the final closing of the entrance (after the eggs have been laid) with an agglutinated mass of vegetable matter requires a certain dexterity. Abandoned nests of other wasps and also galleries bored in plants by other insects are taken over by a certain genus of wasps, but the construction of particular brood chambers is more common.

Another familiar object in houses is the larval case of a moth (which I have heard referred to as the "pocket moth"). The larvae of this moth construct an elliptical and somewhat flat case with their silk to which they add small portions of grit, and are frequently and unjustly accused of damaging cloth fabrics. Actually they feed on the size in whitewash on walls. The case is very neatly woven and in spite of its size is very tough.

The larvae of the family of moths known to science as the Psychidae, but commonly known as "bagworms" utilise portions of their foodplant, either

whole or parts of leaves, twigs, small pieces of bark as an outer and protective covering to the silken sheath in which they live. Among these protective coverings one meets with some strange structures which may resemble bundles of faggots or sticks similar to the "*fascies*" carried by the Roman lictors, a pagoda roof, long and slender cones not unlike certain marine shells, or a somewhat untidy mass of dead leaves. In these the larvae and the adult female moth pass their entire existence, the larvae gradually enlarging the covering in proportion as they increase in size. The female which has only a remote resemblance to a moth lays her eggs in the case and then dies.

Larvae feeding in stored cereals usually collect a small quantity of the grain in which they live and make a rough sort of covering for themselves. This, however, is in no way remarkable and is not comparable with the relatively neat coverings of the Psychidae.

To describe the multitude of different types of cocoons made by larvae just before they reach the pupal stage would take up far more space than is available. It must therefore suffice if only a few examples of the more striking types are given. Silk is the foundation of most cocoons, but some are composed mainly of soil and debris. The common type of cocoon is a flimsy web of silk sufficiently strong to retain the pupa and protect it from the elements, and is usually a single chamber. A communal type of cocoon consisting of one large silken bag containing a dozen or so cocoons also exists.

Cocoons which are entire, that is to say, those which have no specially prepared aperture, may also be of the flimsy type, but many are thick and hard with a thin silk envelope. When the moth is ready to emerge, it softens the hard covering with a fluid secreted from the mouth, and is then able to break through without much difficulty. The cocoon of the familiar Atlas moth, is constructed with an aperture around which is a fringe of stiff converging strands of silk. An arrangement of this kind ensures that an intruder cannot effect an entry, but on the other hand, when the moth wishes to emerge, it has only to press against these strands which part and leave the way clear. This valve-like form of aperture is also found in other cocoons.

To refer now to other types of nests, the most conspicuous example of one constructed underground is that of the mole-cricket, which, with its powerful front legs excavates in the soil a large chamber, oval in shape and with the walls strengthened. Radiating from this chamber are several galleries which lead to the surface of the soil.

Some beetles also construct subterranean nests in which they deposit their eggs. The shape of these nests or cavities in the soil is roughly oval, but there are also nests which comprise a number of tunnels radiating from a single tunnel, the main entrance. The extremities of the branching tunnels are filled up with cowdung, the food of the larva which eventually hatches from the egg deposited in it.

While on the subject of nests constructed in or with soil, it will be appropriate to refer to the habitations of termites, the most magnificent examples

of which are to be found in Tropical Africa, and which, in certain cases, are of huge dimensions. The massive type is, however, remarkable externally only for its size, but if it is sectioned a very large number of cells is revealed. Each of these cells is approximately ovate in shape. The hill-like nests are not all of the same type, the interior of some kinds having a very complicated system of cells and tunnels which interlace and lead in all directions. Not content with erecting a mound of soil to the height of twenty feet or so, another species builds a tall pillar several more feet high on the summit. Seen from a distance they resemble monuments and appear very incongruous, being perhaps a long distance from any habitation or village.

Many species make nests in trees. Of this kind the most common is known as the "tête de nègre", a comparative term which is very apt as anyone who has seen them will agree. Ordinarily they are constructed of "wood paper", but there are others made of soil. The exterior of the former is rough and if seen from a short distance appears to be covered with short woolly hair.

The most striking of all as regards their form are those nests having an almost perfect resemblance to a fungus of the toadstool variety, and those pillar-like erections with a number of sloping and projecting ridges and the top surmounted by a conical cap.

Many more examples of nests constructed in other situations and with other media could be referred to, but as space is limited, the few examples given of the more outstanding nests in which ingenuity in construction is undoubtedly displayed will be adequate to draw attention to an interesting aspect of insect life.

PERFUME FROM PROVENCE.

In the last issue of this Journal I included a note regarding a book which had given me much pleasure, and now, having derived equal pleasure from the above book (by Lady Fortescue, published by Wm. Blackwood & Sons, Ltd.) I feel another note is necessary. If justification is required for this reference to an admittedly non-Malayan book, it is provided by the considerable under-current of gardening matters which runs throughout the book.

It is wholly delightfully written and deals with the settling down in Provence of "Madame" and "Monsieur", the authoress and her husband; the building of an extension to their "Domaine"; their garden and devoted gardener Hilaire; a Provencal wedding; shopping; officialdom; fêtes; all with the patient and tolerant understanding of someone who has apparently mastered the art of getting the most out of life—and out of simple pleasures.

The dedication is to "Monsieur":

"He is a portion of the loveliness

Which once he made more lovely"

and of the book it may be said that loveliness is its portion; to the last poignant paragraph, the simple beauty of which brings a sudden lump into one's throat.

H. L. B.

RENEWAL OF MEMBERSHIP AND MAGAZINE SUBSCRIPTIONS FOR 1938.

With this issue is included a form for the payment of membership subscription to the Malayan Agri-Horticultural Association or of the subscription to *The M.A.H.A. Magazine* for the coming year.

In view of the small sum involved (\$2 or \$1.20), it is hoped that subscriptions will be forthcoming by the end of the year, thus facilitating the despatch of the next issue in January 1938.

Provisions is also made on the form for arranging for *The M.A.H.A. Magazine* to be sent to friends during 1938 as a small Christmas or New Year's gift. If the form is returned in time, future recipients will be advised at Christmas of the subscription registered on their behalf.

Selangor Gardening Society.

QUARTERLY NOTES

Members are notified that owing to Mr. B. Lowe now being stationed at Cameron Highlands, Mr. Chew Sze Foong, 141, Ampang Road, Kuala Lumpur, has assumed the duties of Hon. Secretary. Mr. Eu Kee Eng, Oriental Building, Kuala Lumpur, is now Hon. Treasurer in the place of Mr. A. Arbuthnott who has gone on leave.

Members of the Society met in July at Mr. R. Kerridge's bungalow at Sungei Way, and looked over his lovely garden. The president gave a brief talk on Gloxinias and Dahlias. In September members met at the Central Experiment Station, at Serdang. Mr. Milsum had staged a very interesting exhibit of the flowers and fruit of the Brazil nut, arcanut, oil palm and various spices.

The experimental $\frac{1}{4}$ acre of cocoa was inspected and looked in a most healthy condition, many of the 3 years old trees carrying good crops.

The Dahlia tubers imported early in the year were most successful; the writer had a particularly good variety called "The World." Members are asked to send to the Hon. Secretary the names of any varieties, grown by them, of outstanding merit.

The writer was favoured with a small supply of "Hortomome A" by Messrs. Imperial Chemical Industries Ltd., and was successful in propagating cuttings of *Odontadenia speciosa*. The cuttings taken were stout green wood, cut just below a joint and treated with a solution of the chemical for 14 hours. They were planted in sand in a 4 inch deep seed pan and were kept in a plant house with broken sunlight.

The Committee hope to hold a table decoration competition open to members, non-members, and their servants in November.

The Society recently imported a supply of garden raffia (bass) from home; there is a small quantity still available to non-members at \$1.50 per lb. One pound will last the average gardener at least a year. Trials to date prove it to be much superior to the local equivalent.

It is hoped to hold the next Flower Show in March 1938, and the exact date will be announced shortly.

E. D. B.

Singapore Gardening Society.

QUARTERLY NOTES

Annual General Meeting.

The Annual General Meeting of the Society was held on the 12th July, Mr. R. E. Holtum presiding and fifty members present. In presenting the Report and Annual Accounts, Mr. Holtum said that the Society had grown at a remarkable rate since its inaugural meeting but twelve months ago; to-day it was in a very strong position both financially and in membership, and there was plenty of enthusiasm to continue the good work. The Report and Accounts were unanimously adopted.

Election of Officers and Committee.

The following were elected:

President: Ven. Archdeacon Graham White; *Vice-President:* Mr. F. T. S. Newell and Mrs. O. R. S. Bateman; *Hon. Secretary:* Mr. J. C. Nauen; *Hon. Treasurer:* Mr. G. Martin; *Committee:* Mrs. R. E. Prentis, Mrs. W. H. Stuart Clarke, Mrs. W. Rose, Mrs. L. W. Geddes.

Mr. R. E. Holtum was elected an *ex officio* member.

August Meeting.

An extremely interesting address was given on "The Names of Garden Plants" by Mr. R. E. Holtum before a large attendance. Mr. Holtum gave an account of how most plant names originated and explained the rather intricate system of nomenclature followed by botanists in naming plants.

September Meetings.

By kind invitation of Mrs. L. A. Allen, members visited the Gardens of the Istana and General Adviser's Residence, Johore, on the 13th September. Mr. L. A. Logan Richardson, the Superintendent of the Istana Gardens, conducted the party through the gardens, showing many useful and practical ways in which plant growing can be carried out to the best advantage.

On Thursday, 23rd September, members were invited to visit Mrs. C. G. Mawson's garden. This proved to be yet another instructive demonstration of gardening craft, Mrs. Mawson's garden being made at a minimum expense in the short space of two years.

I. A. R. I. 75.

IMPERIAL AGRICULTURAL RESEARCH
INSTITUTE LIBRARY
NEW DELHI.

[illegible]